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STEEL

The Magazine of Metalworking and Metalproducing

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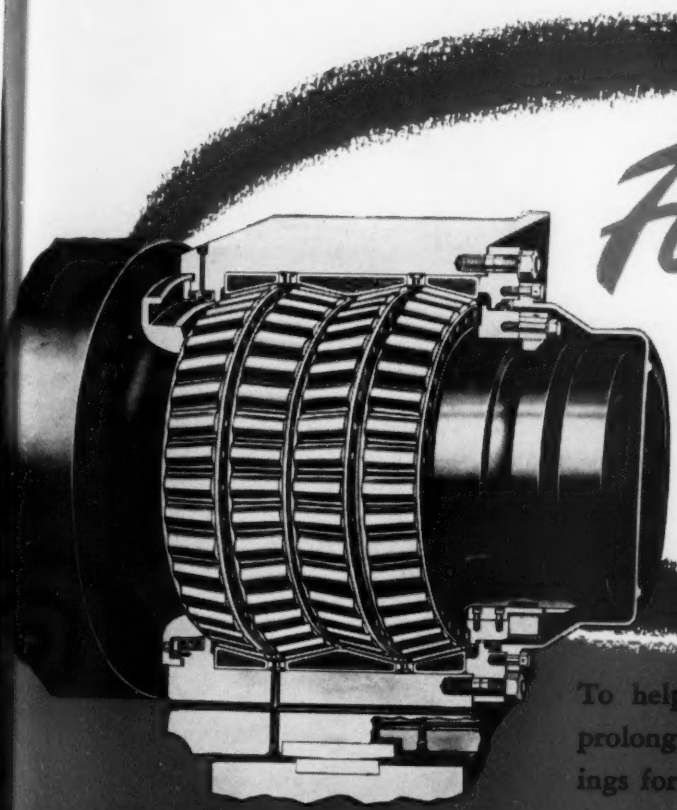

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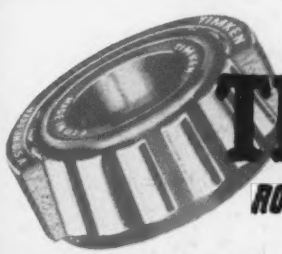

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ANOTHER NEW OSBORN DEVELOPMENT FOR CUTTING COSTS

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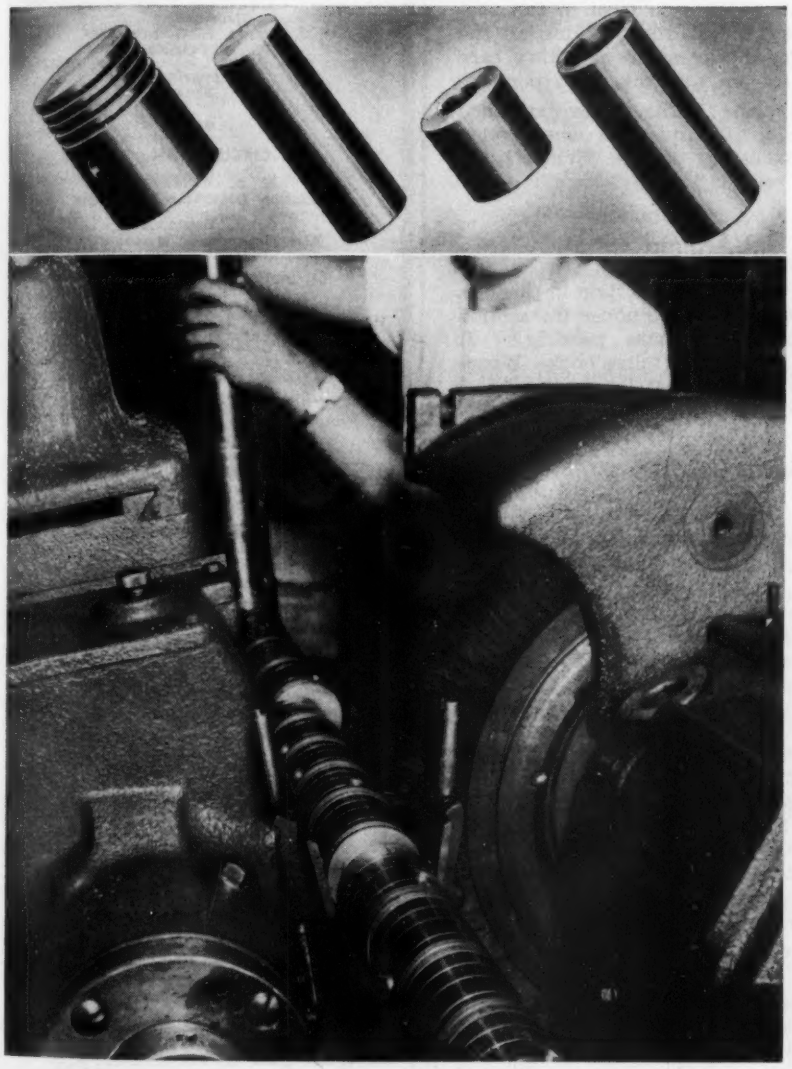

HERE, Osborn "centerless brushing" finishes cast iron pistons to micro-smoothness, greatly simplifying assembly operations and increasing life of pistons and cylinders. Output of this one machine is 10,000 pieces per 8 hours. Rejects in assembly operations have been practically eliminated. The 20" O. D., 6" face Osborn Master® Rotary Brush has .005" crimped wire . . . rotates at 1200 RPM.

For mass-production finishing of cylindrical parts such as pistons, pins, bushings and tubing.

TO speed up assembly operations involving cylindrical parts such as pistons, pins, bushings and tubing, and to improve their performance and prolong their life, Osborn Engineers have developed the application of Power Driven Brushes to centerless grinding machines. This new "centerless brushing" removes sharp edges, burrs and residue—produces micro-smooth finishes on a mass-production basis. It can be applied to many sizes and types of parts, using wire, natural or synthetic fiber Osborn Brushes.

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Behind the Scenes...

Facts & Figures Reprints Available

The editors upstairs are not even thinking of this issue now, but the ones that come out Jan. 23 and the weeks and months ahead. Even the big yearbook dated Jan. 2 is in their files now, but it's not in ours. We were just looking it over again because we've received another phone call of the many calls and letters praising the job. It was from Arthur Tuscany Jr., statistician for the National Screw Machine Products Association and Pressed Metals Institute. He gets the magazine regularly, but he wanted an extra copy of the yearbook.

"I cut mine all up," he says. "It's a gold mine of facts. The whole thing is a dandy."

We're sending on to him the extra copy, and also a reprint of the Metalworking Facts & Figures section. We've had lots of requests for that reprint, and no wonder. Between two covers are the most complete and the most pertinent metalworking statistics ever assembled. If you want another copy of that section, write the Readers' Service Department, Penton Publishing Co., Penton Bldg., Cleveland 13, O. One copy is gratis; prices of larger quantities are given on request.

Ad Cruising

We were browsing in the advertising production department's bailiwick the other day and saw some of the ads that appear in this issue. Our eye was caught by the page for Republic Rubber Division, Lee Rubber & Tire Corp. Republic Rubber is producing a rubber-glass conveyor belt to carry hot loads, such as would be necessary in foundries. Another one that intrigued us was Osborn Mfg. Co.'s ad for industrial brushes. If you want a quick briefing on the role brushes play in metalworking, read what Osborn says.

Are you a lover of dogs? If you want to know how dogs fit into the metalworking situation, see Hanlon-Gregory Galvanizing Co.'s ad. The advertising index, by the way, is on the last page of every issue.

Oh!

We were over in the public library last week, doing some work in a room where 50 or 60 business magazines are available. We were seated at a table next to a long rack containing these publications, among them STEEL. Presiding over the room was a young man at a desk situated at the end of the rack.

On the desk was an important looking sign reading "Information", and as time went on we became aware that this man was very busy answering questions. On the spur of the moment we went up to him. "Just out of idle curiosity," we said, "what magazine do most of the people seem to ask for?" trying all the time to appear as if we didn't care which paper was the most popular.

"Magazine?" The fellow scratched his head. "The question most everybody is asking me is: 'Where's the men's room?' "

They Get Around

Did you notice this item in the Jan. 9 issue on page 108 under the section on reinforcing bars pending? It read: 125 tons, to feline house, Woodland Park zoo, Seattle.

Those editors get around.

Puzzle Corner

Two loyal readers have come up with the correct answer to the puzzle of Jan. 2 about the man who left $1000 with his son divided in ten envelopes so that the son could pay any bill of from $1 to $1000 in even dollars without opening any envelope. The envelopes contained $1, $2, $4, $8, $16, $32, $64, $128, $256 and $489. R. E. McDonnell of Peninsular Steel Co., Cleveland, and E. J. Sampson of Brockton, Mass., turned in correct answers. Mr. McDonnell says that he has a tough puzzle he can submit. We hereby extend an invitation to him or anyone else to send them in—with the solutions, please.

Here's a tricky one; watch your step.

A boy wants to cross a bridge that is strong enough to stand his weight plus 10 pounds. The boy must deliver three balls, each weighing 5 pounds, to the far side, and all at the same time. How does he do it?

Shrdlu

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STEEL

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Production of Gray Iron Castings

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STEEL

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★ Denotes Regular Features

How Reliance Aids Sheet and Strip Users

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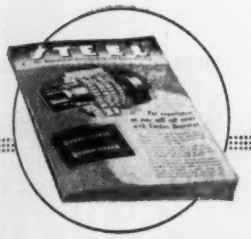


January 16, 1950

Financial Folly

Try to imagine that you and your wife are confronted with this family financial situation: Your income for the year will be $3730. Outgo for necessities and other things you would like to buy will be $4243. If you go ahead on this basis you will dip into the red $513 for the year, increasing your already heavy indebtedness to $26,380 by the end of the year.

What would you do?

The only sound thing you could do, aside from seeking an out through bankruptcy, would be to reduce your outgo or increase your income. If the latter were impossible, your only recourse would be to cut out some of the items in your budget that are not essential.

This grave family budget problem is not pulled out of thin air. It is created by dividing each of four basic figures in President Truman's budget message by 10 million. The precarious financial status of the assumed family is in exact proportion to the nation's financial situation.

Senators and representatives in both parties who are highly regarded for their judgment on tax matters are practically unanimous in believing that taxes should not be increased. Many think they should be reduced. Also there is great cleavage of opinion as to how much of the spending proposed by the President in his budget is necessary and desirous and how much is unnecessary and even dangerous.

Opinion outside of government, and therefore unencumbered by political considerations, is even more emphatically in favor of cutting taxes and expenditures. The Committee for Economic Development, whose previous studies have won widespread respect, proposes a plan for cutting federal spending by $6.7 billion below levels of the present fiscal year. Under this suggestion the government could reduce taxes by more than $2 billion and still have a surplus of $3 billion to apply on the public debt.

The principal advocates of reckless deficit spending are those fair dealers, labor union leaders and others who consciously or unconsciously are striving for a socialistic state similar to that of unfortunate England. They are aping the British Labor government successfully in all but one important detail. Despite austerity, British socialists are balancing their budget. Favored by prosperity, why can't we?

* * *

PROFITABLE ANALYSIS: A cursory study of the new base prices and revised extras on finished steel shows that buyers who study the changes carefully may be rewarded by worthwhile economies in buying.

For instance, consider the new prices of sheets in relation to those of strip. Assume that you are wondering whether it would be better to buy 16-gage hot-rolled carbon sheets in coils 37 in. wide and slit them into six strands 6 in. wide or to buy 16-gage hot-rolled carbon strip 6 in. wide. Under the old base prices and extras, the total cost per ton of sheets would have been $75 and of strip $79. Sheets were $4 cheaper than strip. Under the new schedules the total price of sheets is $74 a ton and of strip $81. Here the price margin in favor of sheets is $7 a ton.

With information such as this available on various alternative forms and sizes of finished steel, buyers can quickly determine whether or not it is feasible to alter specifications or in some instances even change the design of product in order to take advantage of new total price alignments.

Limited inquiry in the field shows that thus far few buyers have explored the possibilities along these lines. Perhaps it is too early for

(OVER)

them to do so. However, weeks hence when revised extra cards from most of the mills are available, painstaking analysis of new prices should be a profitable pastime. —p. 27

* * *

SPECTACULAR RESEARCH: A highlight of the Society of Automotive Engineers convention in Detroit last week was T. A. Boyd's tabloid review of 30 years' research in automotive fuels and engines.

The work started in 1916 in efforts to find out what made engines knock. Initial equipment consisted of a one-cylinder air-cooled engine, a British optical indicator, two pieces of lath, two shingle nails and a tomato can. The search for additives to suppress knock involved the co-operation of dozens of research groups and the trials of thousands of materials and compounds.

Outcome has been a revolution in petroleum refining and a gain in engine efficiency of 30 per cent. This latter means a saving of $2 billion annually in the nation's gasoline bill and conservation of petroleum resources equivalent to 1500 oil wells each spouting 1000 barrels daily. Ahead is the possibility of another 30 per cent gain in economy from research in the high compression engine.

Research pays big dividends! —p.41

* * *

BUDGET IS UNREALISTIC: A quick glance at the President's budget for 1950-51 compared with that of 1949-50 shows how he favors the "welfare" type of expenditures. The sharpest increases are in proposed spending for social welfare and health, housing and development, education and research, natural resources, labor and general government. Sharpest reductions are in international affairs; national defense; agriculture; and finance, commerce and industry.

We wonder what an unbiased jury of the ablest persons in our country would say about this budget. Perhaps they would recommend reduction in most of the "welfare" items—at least until we can better afford them. Also they might recommend that we get a more accurate report on just what is essential for adequate national defense.

A non-political approach to the budget might show that we are trying to siphon money into welfare luxuries that really is needed for maintaining the defensive strength of the nation. —p. 30

* * *

U. S. STEEL AT SEABOARD: One of the last acts of Charles R. Cox as president of Carnegie-Illinois Steel Corp. was to announce officially a fact that long had been rumored. He stated that the U. S. Steel subsidiary is acquiring 3800 acres on the Delaware river north of Philadelphia.

News of the purchase has stimulated a fresh burst of conjecture as to the significance of a large U. S. Steel unit at seaboard. Reaction within the steel industry is that the move is natural and expected. It ties in with many other things U. S. Steel has been doing, such as the development of ores in Latin America. It is logical from the standpoint of recent trends in methods of distributing and pricing steel.

Somewhat unexpected, however, is the extent to which Washington bureaucrats are reported to be agog over big steel's announcement. It is amusing to note the many angles by which the taxpayers' public employees hope to "make a project out of this thing." —p. 34

* * *

LIFE-TIME GUARANTEE: Anybody who can remember the performance of electric motors 30 or 40 years ago must admit that the current models represent remarkable progress. Today many motors operate under more severe conditions more frequently than almost any other type of machinery.

Motor builders are almost at the point where they would like to relieve operators of all responsibility for lubrication, particularly in the case of non-friction bearings. It would be wonderful to guarantee "life-time" freedom from lubrication worries. This goal is not too far-fetched. It can be achieved if the user will install his motor under favorable operating conditions and will not expect the impossible. It is not fair to place the entire responsibility on the lubricant as long as there are deficiencies in design, operating conditions or other important factors. —p. 56

E. L. Shaner

EDITOR-IN-CHIEF

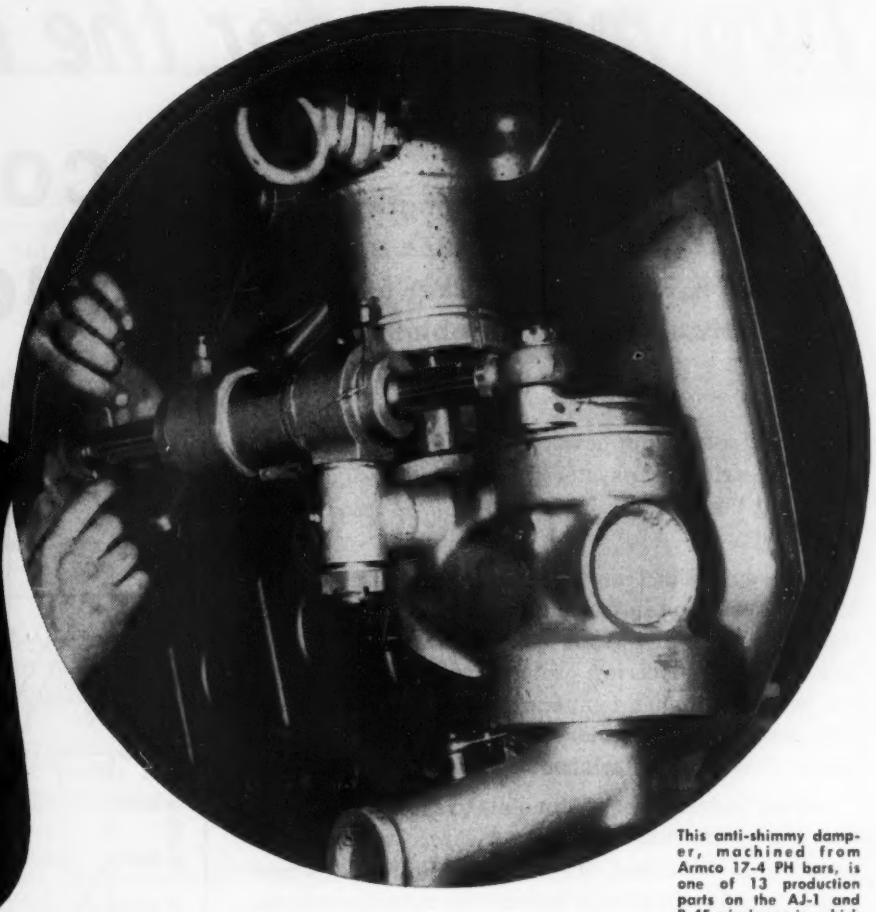
ALL IN ONE

HIGH STRENGTH

CORROSION RESISTANCE

WORKABILITY

HARDNESS



This anti-shimmy damper, machined from Armco 17-4 PH bars, is one of 13 production parts on the AJ-1 and B-45 airplanes in which this special stainless steel is now used.

See what these 2 New Stainless Steels offer you

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Until now, stainless steels that could be heat-treated to high strengths and hardnesses had certain fabricating and service limitations. Armco's new "PH" grades offer you the excellent mechanical properties of the hardenable chromium types, *plus workability and corrosion resistance* closely approaching the 18-8 stainless steels.

"PH" stands for precipitation hardening. The unique properties are the result of a combination of special chemical compositions and heat treatments.

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Now you can have Armco 17-7 PH Stainless Steel sheets that draw and form readily, and with simple heat treatments reach yield strengths up to 160,000 psi in both tension and compression. Hardness can be brought to Rockwell C45.

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17-4 PH BARS

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Get *all* the facts about Armco 17-7 PH or Armco 17-4 PH bearing on your specific problems.

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INCONEL "X"

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With the continuing development of gas-turbine and Diesel-electric power systems, locomotive designers are becoming increasingly interested in *heat-resisting* alloys . . .

Where operating temperatures may soar well past the 1000° mark . . . as in turbine blades, exhaust systems, turbo-chargers, and steam generator fire pots . . . new and serious engineering problems must be solved. At red-heat and higher temperatures, destructive oxidation, accelerated corrosion, and heat-softening become major threats to materials of construction.

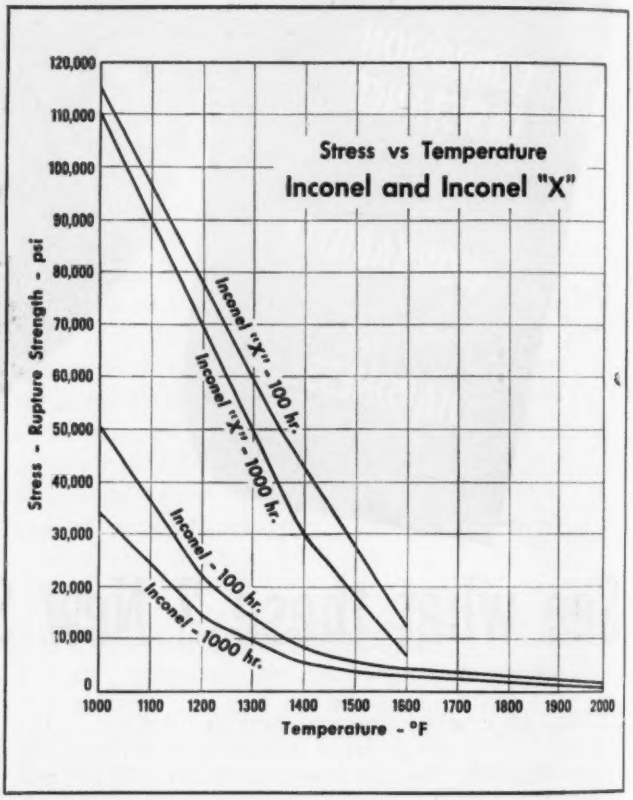
Among the relatively few metals to show satisfactory long-time performance under such severe service conditions are *Inconel** and *Inconel "X"**. Both alloys have equally good resistance to destructive oxidation at temperatures up to 2000° F. Both alloys are workable. And both alloys are *practical* in cost.

Inconel serves best where a high degree of corrosion-resistance is required and where moderate hot strength is sufficient . . . as, for example, in exhaust systems, expansion joints, and combustion chambers.

But where "super" properties are needed, age-hardenable *Inconel "X"* should be specified. In addition to a corrosion-resistance equal to that of *Inconel, Inconel "X"* offers higher hot strength, particularly in the 1200° to 1500° F. range. Typical applications for *Inconel "X"* are: turbine wheels and blades, structural members, high-temperature springs and fastenings.

In short . . . for applications where its higher cost is warranted, call for *Inconel "X"*. But for most "every day" high heat jobs, specify economical *Inconel.*

If you are concerned with metal specification, your reference files should contain full engineering information about these two heat-defying Inco nickel alloys. Write for it . . . today. And remember, too, that our Technical Service Department is always ready to help you solve metal-selection and fabrication problems.



INCONEL *"X" is age-hardenable and offers exceptional mechanical properties as well as high resistance to destructive oxidation.*

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"L"* NICKEL • INCONEL* • DURANICKEL* • PERMANICKEL* • INCONEL "X"*

News Summary

SLITTING—You may be able to cut fabricating costs by slitting your own steel (p. 27). To offset new extra charges, it may not be economical for everybody to slit his own, but more and more metalworking executives are looking into the possibilities . . . . Senator O'Mahoney (p. 28) has set aside four days beginning Jan. 24 to hear witnesses on steel price boosts.

OPPORTUNITIES—Here may be other ways to cut costs or boost sales: A new French steel process (p. 38) promises to revolutionize design, lower costs in many products; the technique permits the fabricator to hot-form complex shapes . . . .Eastern railroads are considering applying for lower freight rates for heavier loads; modern cars can handle bigger tonnages cheaply . . . The plastics industry (p. 39) is booming; it uses ovens, handling apparatus, presses, molds and dies . . . Alaska (p. 28) represents a $400 million potential sales market.

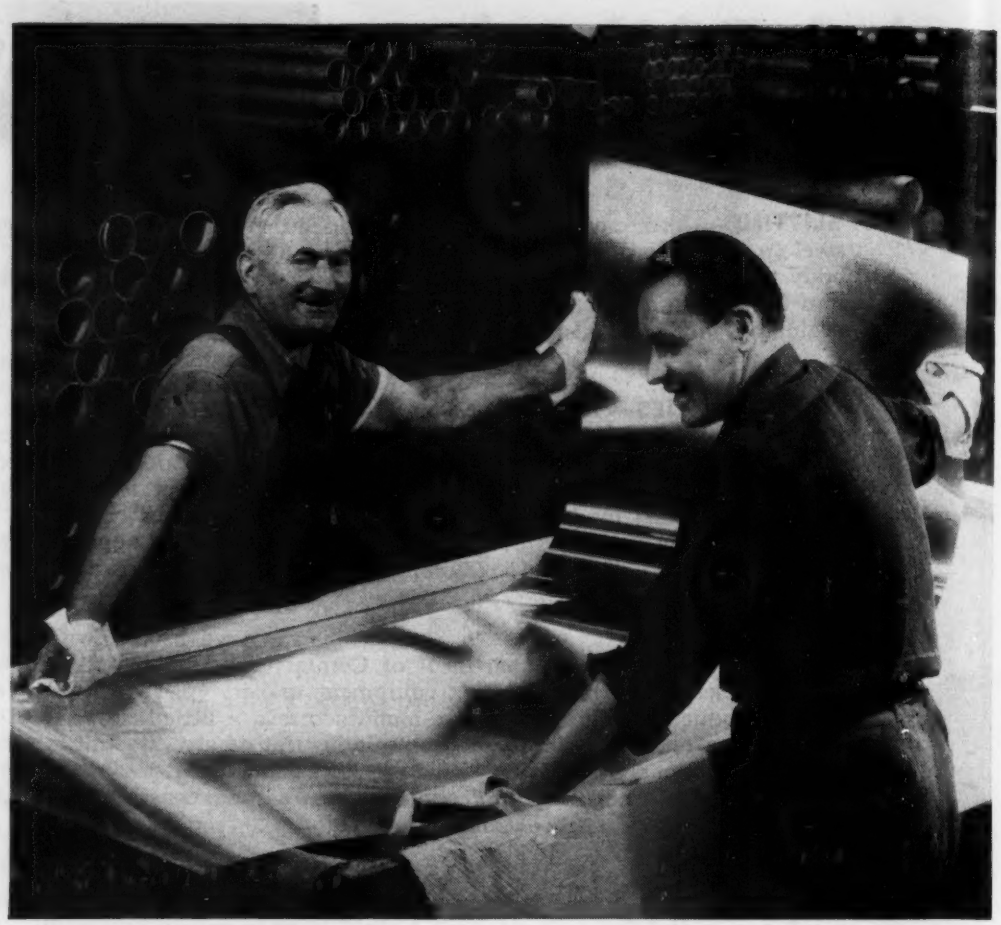
BUSINESS WEATHER—Department of Commerce predicts a prosperous year for machinery and transportation equipment makers (p. 28). It sees a $28.3 billion production volume for these manufacturers, a little below the $30.8 billion volume estimated for 1949. Some industrialists are discounting rosy economic predictions. One asks: "Where is this good business we're supposed to be enjoying?" Another points out that many road construction equipment makers are pulling in subcontracting jobs.

PENSION COSTS—The "pay-as-you-go" system of financing pensions comes up for approval as steel companies get out their proxy statements (p. 31). Republic Steel Corp. figures the pensions will cost $9.1 million annually should the plan continue for the next five years under the present term arrangements. Republic's pension agreement permits the company to terminate the plan at the end of two years. Should this be done, the annual costs for the next two years would be $13.7 million.

FEDERAL BUDGET—Prospects for another year of unbalanced federal budgets in fiscal 1951 brought reactions ranging from indignation to apathy from Congress and the public (p. 30). Republican and southern Democratic congressmen promise to sharpen their aim for a coming Battle of the Budget. Industry has some ammunition in the form of CED proposals that government can reduce taxes by more than $2 billion and still have a $3 billion surplus. Astronomical federal figures take new proportions if scaled down to John Q.'s size. If he were in the same fix as Uncle Sam, he would have gone in the red last year $513 and would have a total debt of $26,380.

IRON ORE—Scattered reports indicate that things are cooking in iron ore. The proposed U. S. Steel Corp. plant on the Delaware river has brought ore talk to a boil (p. 34). Such a plant would depend on foreign ore. Washington is intrigued by trade, merchant fleet and ore conservation possibilities. Baltimore & Ohio Railroad will build a tidewater ore pier in Baltimore (p. 44). Inland Steel Co. has taken an option on ore lands in Ontario (p. 32). Brazil has 17 billion tons of high grade ore far inland but no facilities yet are available to mine and ship it. An American engineering firm is figuring on a job for National Steel Co. of Brazil to build two blast furnaces (p. 33).

HERE AND THERE IN INDUSTRY—SAE held its annual meeting in Detroit last week (pp. 33, 41) . . . . The 1949 ingot production totaled 77,860,943 tons (p. 32) . . . . Ford may build a $100 million plant in Cleveland (p. 42) . . . . Federal government will step up its fight against water pollution (p. 36) . . . . Seattle must decide this: Award an equipment contract to the low British builder or buy American (p. 29) . . . . Perimeter heating for ranch-type homes is being used in a large housing project in Chicago (p. 38).



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Slit Your Own?

Steel consumers look for ways to offset higher prices, extras. Slitters may be one answer

WORRIED that the increase in steel prices and revision in extras may derail your plans to make 1950 a cost-cutting year? Doing your own slitting may be the answer to holding down if not lowering fabricating costs. It's worth investigating and an investment that may pay handsome dividends.

Perhaps you think your operation is too small to justify the investment. This may or may not be true. Makers of slitting machinery point out that few firms which are cutting costs by using this equipment operate their lines more than 50 per cent of their work day. Some of them run the slitters as little as one day out of five and still save money.

Investigation May Pay—One example of where it would pay to look into the advisability of installing slitting equipment follows. It may suggest possibilities for your plant.

Savings by slitting sheets into six 6 in. strands rather than buying 6 in. strip. One inch allowed for side trimming.

Hot-Rolled Carbon Sheets in Coils, 16 gage, 37 in. wide

	Old	New
Extra for width, ton	$10	$ 7
Base price, ton	65	67
Total, ton	$75	$74

Hot-Rolled Carbon Strip, 16 gage, 6 in. width, mill edge

	Old	New
Extra for width, ton	$14	$16
Base price, ton	65	65
Total, ton	$79	$81

	Old	New
*Savings per ton of sheet compared with strip	$4	$7

Assuming cost of slitting equipment line is $25,000, the use of slitting equipment on 3600 tons would pay for initial cost of equipment. Heretofore, savings on 6250 tons would be required to pay for initial cost.

*Does not take into consideration scrap loss, variations in freight charges, etc. Extras and base prices are those of a leading producer.

The example does not take operating and overhead costs into consideration. These factors would vary from plant to plant.

No hard-and-fast rule can be given as a guide to when it would be profitable to install a slitter. Each steel consumer will have to weigh all the advantages against the disadvantages in his own case.

Don't Booby-Trap Yourself—Since the advance in steel prices and changes in extras there has been an increase in inquiries about slitters. Some of the firms making these inquiries have scared themselves out of the market with a booby-trap of their own design. Upon hearing that the new price schedules make it more advantageous in some instances to buy wide sheets instead of narrow these firms have asked for quotations on 60-in. slitters. A direct answer without an explanation usually convinces the inquirer that a slitter is too expensive.

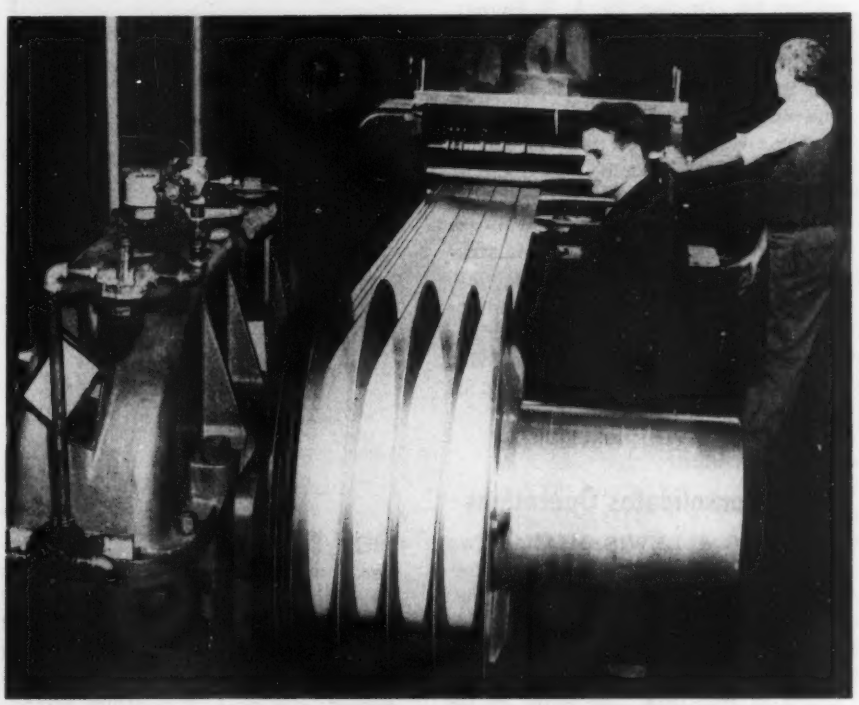
Prices Within Reach—Most of the standard slitters sold today handle 12, 24 or 36 inch coils, a few go up to 48 inch. Since slitters of these sizes are fairly standard equipment rather than custom-made, the prices are within the reach of many companies. King-size models, however, are custom-built and the prices are correspondingly high. Many metalworking plants lack the materials handling facilities needed to cope with coils as large as the king-size slitters would take, and in many instances it would not be economical to have this equipment installed.

Slitters are being built by a half-dozen companies and a few firms now making shearing equipment are investigating advisability of entering the field. If demand for slitting and special handling equipment for the slitting lines justifies the high cost of engineering a new product, they will throw their hats into the ring.

Other Benefits—Factors other than savings in actual slitting costs may make an investment in a slitter line desirable, says John I. Lucas, president, Yoder Co., Cleveland. Reduction in sheet inventories is a big factor in many cases. Instead of stocking all the needed widths of material, the stocks can be held to a minimum of wide coils of needed gages, the coils being slit into narrower widths as and when required, Mr. Lucas points out.

Capacity of slitting equipment is usually such that there is no danger of its being unable to keep ahead of shop demand. Convenience is another reason why some firms feel the equipment is a worthwhile investment, Mr. Lucas adds.

All of the present slitter line builders agree that potential slitter customers have a tendency to over-



SLITTER
. . . may be your answer to lower costs

estimate the capacity they want built into their equipment. This is true in regard to both width and gage. Thorough study of his needs by the buyer will reduce both the initial investment and possible scrap losses. Unused or rarely used extra capacity is an expensive luxury.

To Testify on Prices

Four days set aside by congressional committee for hearings on steel price increases

FOUR DAYS, starting Jan. 24, have been set aside by Senator O'Mahoney's Joint Congressional Committee on the Economic Report for public hearing of witnesses invited to comment on the increases in steel prices.

Substantially half of the witnesses will defend the increases, with the others condemning or criticizing the action. Contrary to original expectations, only one from United States Steel Corp. is scheduled to appear—Benjamin F. Fairless, president.

Government Officials To Report—Testimony developed at the public hearings will comprise only one phase of the committee's investigation. In addition to studies by its own staff, the committee has asked a number of government departments and agencies for detailed reports on the price increase and its probable effect on steel consumption and on steel company profits.

Schedule for Witnesses—Mr. Fairless will appear before the committee on Jan. 24. On Jan. 25, A. B. Homer, president, Bethlehem Steel Co., H. G. Batcheller, chairman, Allegheny Ludlum Steel Corp., and Ernest P. Weir, chairman, National Steel Corp., will appear. Witnesses on Jan. 26 will be A. W. Phelps, president, Oliver Corp., Philip Murray, president, Congress of Industrial Organizations, and Jesse Larson, General Services administrator. On Jan. 27, the concluding day, David L. Cole, attorney, and a member of last year's steel fact-finding board, and Dr. Alfred C. Neal, vice president, Federal Reserve Bank of Boston, will be heard.

G & L Consolidates Operations

GIDDINGS & LEWIS Machine Tool Co. is transferring operations formerly conducted at the Cincinnati plant of Cincinnati Planer Co. to Fond du Lac, Wis. The Cincinnati firm was acquired by Giddings & Lewis in mid-1948. The move to the parent company's shops is scheduled to be completed by July 1.

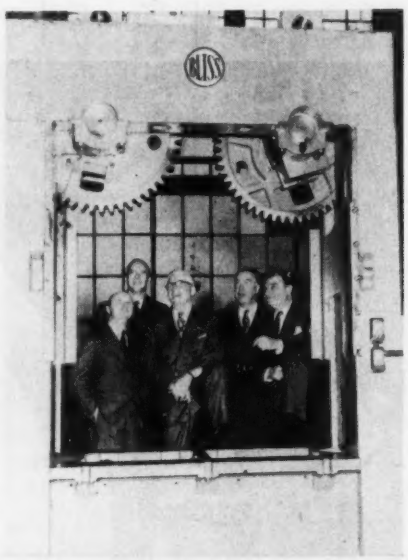
Slight Drop Seen in Metalworking Sales

Most industries producing machinery and transportation equipment expected to find business in 1950 almost as good as that in 1949

A GOOD year for most industries producing machinery and transportation equipment is predicted for 1950 by the Department of Commerce.

Value of machinery and parts production is set at $19 billion; $9.3 billion for vehicles and parts. While somewhat below the 1949 output, estimated at $20.1 billion and $10.7 billion respectively, the totals for 1950 are expected to compare favorably with the $19.1 billion production of machinery and $9 billion output of transportation equipment reported in the 1947 Census of Manufactures figures.

Autos Lead—Of the anticipated 1950 machinery production of $19 billion, $10.5 billion is of industrial machinery (except electrical), $6.8 billion of electrical machinery and apparatus, electronic devices and controls and $1.7 billion of farm machines and tractors. Of the 1950 output of land transportation equipment totaling $9.3 billion, $8.8 billion is predicted for the automotive industry and $500 million for railway locomotives and cars. (For STEEL's analysis of metalworking prospects for 1950, see the Yearbook issue of Jan. 2, pp. 99-108.)



PRESS FOR FIAT: Norm J. Kirk (extreme right), manager of E. W. Bliss Co.'s Toledo Division, explains drive construction of a new Bliss two-point press that is being shipped to Fiat Automobile Co. of Italy. His companions are part of a group attending a two-day general sales conference

An upward trend in output of industrial machinery (except electrical) that began in the last quarter of 1949 after a decline in the second and third periods should continue into early 1950. Production for the year may approximate the $10.6 billion reached in 1949. Machine tool output, says the Department of Commerce, should rise in 1950. Production value may hit $300 million, compared with a 1949 value of $248 million. Production of excavating and earthmoving equipment should equal 1949's total of about $740 million.

Electric Machinery Decline Seen—In electrical machinery and apparatus, a generally declining trend in 1949 will probably continue in 1950. But production of heavy electrical machinery will continue about as in 1949. An increased demand is anticipated for electronic equipment.

In the automotive field, Commerce analysts say it is unlikely that 1949 output will either be equaled or exceeded in the next few years. From 5 million to 5.5 million units will be turned out in 1950, or 15 per cent fewer than in 1949.

Farm Machinery To Slip—Farm machinery and tractor production in 1950 should approximate that of 1947, three times the average output for 1935-1939. But this year's output may drop 15 per cent below the $2 billion production in 1949.

In railway equipment, 2500 locomotive units worth $330 million may be ordered in 1950. The 1949 production was worth $226 million; 1950 production may hit $250 million. It is estimated that 42,500 freight cars worth $195 million will be ordered in 1950, compared with 6248 cars ordered in 1949 and 92,787 in 1848. About 275 passenger cars may be ordered in 1950 for domestic use, compared with 145 in 1949 and 517 in 1948.

In shipbuilding, 682,000 gross tons of shipping will be completed in 1950, a decline of 12 per cent from 1949.

Alaskan Market Grows

Alaska represents a potential market of nearly $400 million for American manufacturers in 1950. A large portion of Alaskan purchases will be construction materials, railroad equipment, and plant machinery.

These were estimates of J. P. John-

son, general manager of the Alaska Railroad, and B. H. Parkinson, executive vice president of the Coastwise Line (Los Angeles-Seward), during a special symposium before the World Trade Committee of the Los Angeles Chamber of Commerce.

It was pointed out that population of Alaska is growing steadily, large-scale housing projects are underway, plans are being drawn for new pulp mills, and Aluminum Co. of America is planning to construct a large mill in Skagway.

Bidding procedure on merchandise for Alaska recently was changed from f.o.b. Seattle to f.o.b. Alaska. Manufacturers can obtain bid information on government supplies, including steel rails and railroad equipment, from the Federal Bureau of Supplies.

Alaskan transportation has been improved and modernized since the war. The government-owned Alaska Railroad, whose 400 miles of track provide direct connection with steamship lines at Seward, has been completely rehabilitated during the past two years. New steam and diesel engines, all steel rolling stock, and new road-beds have been provided, at total cost of $76 million. Plans call for modernization of the railroad shops during 1950.

Servel To Boost Output

Servel Inc., Evansville, Ind., has increased its production of household gas refrigerators by 50 per cent and plans to increase it again this year.

The company is reducing prices on all its new models despite rising costs. Servel will boost its advertising expenditures in 1950 by between 50 and 100 per cent.

Laundry Machine Sales Off

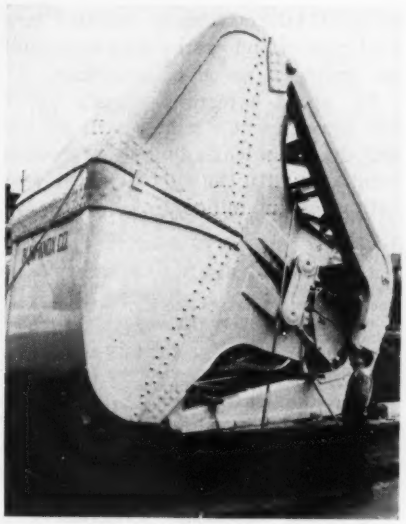
Industry-wide sales of laundry equipment will total about 3,040,000 units in 1950, or about 1 per cent less than in 1949, says C. E. Anderson, manager of the home laundry division of General Electric Co., Bridgeport, Conn.

Gains will be made by automatic washers, ironers and dryers, but there will be about a 10 per cent drop in wringer washers.

Norge Appliance Future Good

Sales of Norge home appliances in the second half of 1949 more than doubled the volume of the first six months, says George P. F. Smith, president of Norge Division of Borg-Warner Corp.

"The last six months in the home equipment field have been exceedingly good saleswise," says Mr. Smith. "There is good reason to expect Norge sales in the first half of 1950 to be much better than in the corresponding period in 1949. Last year wholesale and retail inventories reached a new high; now they stand at an alltime low."



ON CIRCUITOUS ROUTE: Because of the size of this clamshell bucket—the largest ever shipped by Blaw-Knox Co., Pittsburgh, in fully assembled form—it was necessary to load it on its side in a specially depressed car. It was routed to avoid tunnels and low clearance points on railroads

Farm Machinery Sales Shift

Minneapolis-Moline Co. expects its farm machinery business to resume a prewar seasonal pattern in 1950.

Sales ups and downs in 1949 indicate that the trend will be more pronounced this year for the Hopkins, Minn., company. The 1949 sales volume established a new high record for Minneapolis-Moline.

Inventory amounted to $27,170,260, an increase of $3,118,514 over the previous year because of more company and distributor-held stocks resulting from a return to a more seasonal buying basis.

Freight Car Deliveries High

Domestic freight car deliveries in 1949 totaled 92,562. This is the second highest total since 1924 and in the past 25 years has been exceeded only by 1948's 112,634.

Domestic freight car deliveries in December totaled 3330, says the American Railway Car Institute. This compares with 4376 in November and 9967 in December, 1948.

New cars ordered in December totaled 1220, including 670 placed with car builders and 550 in railroad shops. The 1949 figures for new car orders was 6248, against 92,878 in 1948.

Backlog of unfilled orders on Jan. 1 was 12,036, compared with 103,896 a year earlier. Of these, 3760 were placed with car builders and 8276 in railroad shops.

Auto Battery Prices Cut

Electric Auto-Lite Co. cut prices Jan. 10 more than 7½ per cent on automotive storage batteries.

The new reduction, the second in eight months, affects the line sold under both Auto-Lite and Prest-O-Lite trade names. The decline in the price of lead is the major factor in this price reduction. The Toledo, O., company also has made production economies.

McKee Anticipates Decline

Considerable decline in construction activities in industries served by Arthur G. McKee & Co., engineers and contractors, Cleveland, dims the company's outlook for new business in 1950.

The decline has been evident the last nine months, and the firm foresees no marked upturn in volume soon.

Earnings prospects, however, are favorable for 1950, based on income expected from work now in progress and scheduled for completion this year.

The company made rapid progress on the large backlog of work it had in process at the beginning of 1949 and on new work taken. Among projects completed during the year were two fluid cracking plants, steel plant facilities, and rebuilding of several blast furnaces. Uncompleted work at the beginning of 1950 included a synthetic gasoline plant in the U. S., petroleum refineries in Canada, France, Holland and Mexico, and several blast furnaces in England.

Seattle Has Buy-Buy Blues

Seattle city officials are pondering the knotty problem of whether to patronize American manufacturers or accept lower offers made by foreign firms.

City engineers are analyzing the bids of two British firms for transformers to be installed in Ross dam, Skagit project. These came from English Electric Co. Ltd. and Ferranti Co. Ltd. Preliminary figures show the lowest British bid was about $550,000, compared with $720,000 from Pennsylvania Transformer Co., Pittsburgh.

The city charter provides that preference shall be given materials produced within the state of Washington if not in excess by 5 per cent of the lowest bid. There is no specific mention of preference for American as against foreign products.

Budget Battle Looms

President's recommendations spur demands among congressmen for cuts in spending

A BUSINESS MAN in a barber's chair nearly got scalped when he leaned forward while reading an account of the President's budget message.

"Another year of deficits!"

"Oh, that," said the barber, yawning. "Nineteenth year in the red, isn't it?"

Congressional and public reaction to Mr. Truman's budget ranged from indignation to apathy. Sentiment of Republican and southern Democratic congressmen is: "If we can't stay in the black when times are good, when can we?" One thing is certain: The proposals will be considerably mauled by the time Congress gets through with them.

Based on Present Taxes—The federal estimates are based on present taxes. Mr. Truman says he will seek new tax revenues, but just what he hasn't made clear. He does ask for a boost in combined payroll tax levies from 3 to 4½ per cent. He proposes that $2 billion in new funds be provided for aircraft purchases. He asks for a $2 billion increase in Commodity Credit Corp. lending powers. He is cutting ERP aid from $4 billion to $3250 million. He allots $298 million for shipbuilding. He seeks $1112 million to expand present power and water programs, but he proposes no new programs.

By broad categories, here's where the government's money will go under the President's budget proposals, compared with the current fiscal year estimates—in millions of dollars.

	1950-51	1949-50
International Affairs	4,711	5,964
National Defense	12,545	13,148
Veteran Benefits	6,080	6,905
Social Welfare and Health	2,714	2,297
Housing and Development	1,328	1,006
Education and Research	434	125
Agriculture	2,206	2,671
Natural Resources	2,217	1,845
Transportation-Communications	1,682	1,845
Finance, Commerce, Industry	212	225
Labor	243	219
General Government	1,267	1,223
Public Debt Interest	5,625	5,725
Reserve	175	50
Total	42,439	43,297

12-Point Economic Program—In an economic message that preceded the budget report, President Truman offers a 12-point program aimed at a $300 billion output by 1954. His 1950 objectives are jobs for 61 million and a 7 per cent boost in national output. The President seeks more authority over bank reserves, consumer credit powers, more authority to regulate speculation in commodities, revision of tax laws on foreign investments and lengthening of the maturity period for RFC loans. The rest of his requests are the same as in the State of the Union message (see STEEL, Jan. 9, p. 17).

This report really supplements the budget message. Concrete reaction to Mr. Truman's program will shape up in the Battle of the Budget now looming in Congress.

CED Offers Economy Plan

Industry has some budgetary suggestions for the government. They are offered by the Committee for Economic Development.

CED says the government can reduce taxes by more than $2 billion and still have a $3 billion surplus to apply on the public debt in the fiscal year beginning next July 1. The plan calls for cutting federal spending by $6.7 billion below levels of the present fiscal year, and it is based on the assumption of high employment.

In tax proposals CED recommends:

1. Repeal of many excises, to cut tax yield by $1 billion.

2. Reduction of double taxation of dividends, to cost $1 billion in revenues.

3. Required payment of federal income tax on interest from state and local bond issues, now exempt, to give government an added revenue of $35 million the first year and more thereafter.

4. A carry-forward corporate income tax plan to permit companies to deduct losses of one year from the profits of the five following years; the change would cost nothing the first two years, a little the third year, $500 million annually thereafter.

5. Elimination of the 53 per cent "notch rate" on corporate profits from $25,000 to $50,000, to be replaced by a gradually rising scale of rates to the first $50,000.

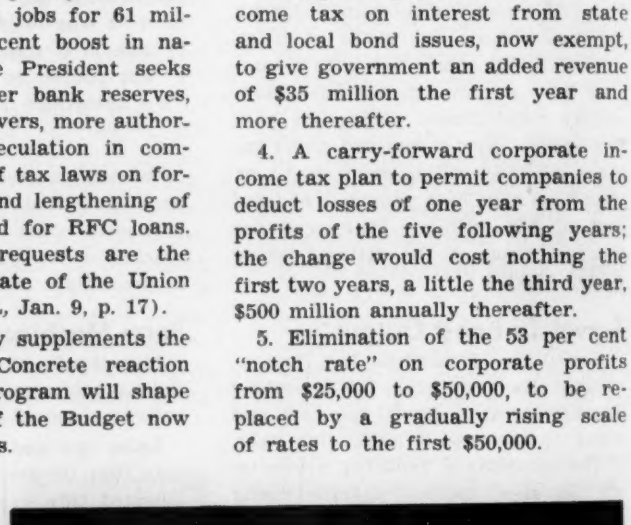
Figures That John Q. Can Understand

DO multibillion dollar figures confuse you in trying to comprehend the government's financial position?

Here's a quick way to cut astronomical figures down to sizes you understand. Just zip off the seven right-hand digits from what President Truman gives as 1951 budget estimates of the government's annual expenditure, annual income, annual deficit, and gross federal debt. Let the resultant figures represent yearly expenditure, yearly income, yearly deficit, and personal debt, respectively, of an individual (we'll call him John Q.). While the figures are reduced to understandable size they retain the original proportions, show graphically the gravity of the government's financial situation, like this:

	U. S. Government	John Q.
Year's Outgo	$42,439,000,000	$4,243
Year's Income	37,306,000,000	3,730
Year's Deficit	5,133,000,000	513
Total Amount in Debt	$263,800,000,000	$26,380

This translates the government's position into that of a $3730-a-year man who spends $4243 a year, "goes in the hole" another $513 and pushes his debt to $26,380. An unpleasant thought to contemplate? An increasing number of congressmen think so.



Any solution for this problem, Albert?

Pension Costs Estimated

Republic finds new retirement benefits for wage earners to cost $9,100,000 annually

WHEN steel executives go before Senator O'Mahoney's committee Jan. 24 to explain why steel prices are higher, they probably will point first to the cost of pensions.

Stockholders are getting a preview of the cost of the $100 a month retirement benefits in proxy statements accompanying notices of special meetings to ratify the pension plans. Cost estimates are those by the companies' actuaries on the basis of "pay-as-you-go" plans being adopted by most steel producers.

Steel managements are recommending to stockholders that the plans be ratified and point out that work stoppages likely would result if the plans were not approved.

Republic Estimates $9,100,000—Republic Steel Corp. figures the new pensions will cost $9,100,000 annually should the plan continue for the next five years. The pension agreement permits the company to terminate the plan at the end of two years. Should this be done, the annual cost would be $13,700,000.

If Congress should increase federal Social Security benefits, the cost to the company would be reduced.

H. R. 6000, approved by the House last year and now awaiting Senate action, would expand benefits substantially and would increase the taxes paid by employees and employers by raising the taxable wage or salary base from $3000 to $3600. It also provides for future sharp increases in the rate of taxes.

About $160 per Employee—Republic has 58,000 workers who might qualify under the new pension plan. This includes nearly 51,000 wage earners and about 7500 salaried employees. On the basis of the company's estimates, the cost per employee would be nearly $160 a year, or 8 cents an hour on the basis of a 2000-hour work-year.

Republic already has a pension program for salaried employees earning more than $3000, the Social Security base. For 1949, this plan cost the company $3,026,000. It will be continued, although benefits will not be duplicated.

Retirement of eligible employees will start Mar. 1, 1950, if the plan is approved. Workers with 25 years of service will receive a minimum of $100 a month, including social security. Employees retiring with 15 to 24 years of service will receive proportionately less.

Disability Allowances — Employees with 15 years of service who are permanently incapacitated before reaching 65 will receive a pension of not less than $50 a month until reaching the retirement age. Then they will receive the pension to which they are entitled by years of service before being incapacitated.

Republic points out that no accurate estimate is available of the aggregate cost of past service benefits for all employees as of Mar. 1 if the proposed pension plan were continued indefinitely and without change. Such past service costs, however, would be very substantial.

Republic proposes to pay into a trust fund each year for five years one-fifth of the amount necessary to fund the pensions of those employed who are eligible for pensions on Mar. 1, 1950, and who retire. Other pensions will be fully funded as they become payable.

Asks Stockholders' Approval — Frank Purnell, Youngstown Sheet & Tube president, asks shareholders to approve the pension plan lest a new strike interrupt production.

Company's actuaries say Sheet & Tube must charge $953,000 to earnings to provide pensions for employees retiring before Mar. 1. They estimate $2,097,000 more will be required annually in 1950 and 1951. These estimates are based on an average retirement age of 68. If average retirement age is lower, pension costs will be increased.

Present Tense Better

"THE GOOD old days were terrible." That's the message that Jones & Laughlin Steel Corp. is giving to its 44,000 employees at the turn of the half-century. The statement is made in advertisements appearing in newspapers in towns and cities where J&L has plants.

The company backs up its claim by pointing out that 50 years ago iron and steelworkers had an 84-hour work-week, worked mostly with their hands and backs and earned a base pay of 14 cents per hour.

Today's steelworkers have a 40-hour week and earn an average pay of $1.70 per hour. They operate huge machines that give them finger-tip control of thousands of horsepower.

Oppose Non-Red Oath: Fired

Refusal to sign non-Communist affidavits brought dismissal to five Stewart-Warner Corp. employees who were stewards and officers of a United Electrical Workers local union at Chicago.

Loyalty oaths were asked of the five after a Department of Defense bulletin warned possible military contractors that they might be denied military information if any of their employees have been associated with subversive groups.

The five men said they were willing to sign "uninvolved" affidavits "despite personal objections to thought control devices." The UE has threatened to file charges of unfair labor practice with the National Labor Relations Board unless the company accepts "simple" non-Communist affidavits and reinstates the five men.

Fewer Wage Increases in 1949

Only one-third of the 15 million unionized workers won general wage increases last year. The increases were smaller than in 1948, and there was no "pattern."

The President's Council of Economic Advisers points out that cost of labor rose considerably in spite of the relatively mild wage increases because of pension and social insurance grants.

The advisers estimate that workers' wage income increased from $135.1 billion in 1948 to $136.8 billion last year. Average weekly earnings rose from $54.14 to $54.78.

Wire Company Chooses VP

WALTER F. Munford is the new vice president of operations for American Steel & Wire Co., Cleveland, subsidiary of U. S. Steel Corp.

He moves up from the post of assistant vice president of operations and succeeds Harvey B. Jordan who vacated the vice presidency to become president of American Steel & Wire, Jan. 1. Mr. Munford first began working for that company in 1919 as a die reamer. All of his employment has been with American Steel & Wire, with exception of about a year when he was with the Lorain, O., works of National Tube Co., another subsidiary of U. S. Steel.

Company Operates Despite Fire

MEXICO Refractories Co., Mexico, Mo., suffered a $150,000 fire Jan. 2, but it will still be in partial production of refractories by about Jan. 19 and in full production in February.

The company had good stocks of material already stored that are being shipped to customers. Arrangements have been made to serve customers as promptly as possible on those items not available in stock.

The company's heavy production departments were not seriously affected by the fire.

1949 Steel Output

Totals 77,860,943 tons, third highest in history for a war-free year

PRODUCTION of raw steel in the United States during 1949 was the third highest in history for a year free of war or the influences of war. The year's output was 77,860,943 net tons, says a preliminary tabulation by the American Iron & Steel Institute.

To produce this tonnage, steelmaking furnaces operated at an average rate of 81 per cent of capacity during the year, the institute points out.

Fourth-quarter output, 12,851,543 tons of ingots and steel for castings, was the lowest of the year as a result of the steelworkers' strike. Steelmaking furnaces were operated at an average of 53.1 per cent of capacity that quarter, compared with 78.8 per cent in the third quarter, 91.2 per cent in the second quarter, and 101.5 per cent in the first quarter.

December's production, totaling 7,709,848 tons, was the largest since May, 1949, the steelmaking furnaces operating at an average of 94.6 per cent of capacity in December.

Inland Options Canadian Ore Area

INLAND Steel Co. has taken an option to lease from Steep Rock Iron Mines Ltd. a large undeveloped tract known as "C" ore body near Steep Rock Lake, Ont., to develop a new iron ore mine. Inland expects to begin an exploration program soon.

Exploration and development work in the Steep Rock lake area began in 1937. Shipments of iron ore began in 1944. Steep Rock Iron Mines is currently shipping ore from its Errington Mine and is developing a new Hogarth Mine. In 1949 company shipments amounted to more than 1 million tons.

Superior Offers Titanium Tubing

SUPERIOR Tube Co., Norristown, Pa., announces the limited availability of Weldrawn titanium tubing.

The company's three standard tempers—annealed, half hard and hard drawn—are being offered. Sizes produced range from ¾ inch x 0.049 inch wall down to ⅛ inch x 0.010 inch wall. Development work continues and heavier wall thickness will eventually be offered.

Scrap Men Meet in Washington

A BLUEPRINT for the scrap industry in 1950 will be presented at the annual convention of the Institute of Scrap Iron & Steel, Jan. 22-24, at Hotel Statler, Washington.

Speakers at the meeting will include Leon Keyserling, acting chairman of the President's Council of Economic Advisers; Henry Roemer Jr., executive vice president of Sharon Steel Corp; and Henry P. Fowler, manager of the trade association department of the Chamber of Commerce of the United States.

Virginia Steel Expands in Alabama

VIRGINIA Steel Co., Richmond, Va., is expanding its Birmingham plant with a $100,000 to $150,000 addition.

H. C. Major, Birmingham district manager, says a new product, steel joists for building purposes, will be fabricated in the additional plant area. Virginia Steel is opening sales offices in Orlando, Fla., and Atlanta.

Alan Wood Mill Nearly Ready

ALAN Wood Steel Co., Conshohocken, Pa., on Jan. 23 will put its new $9 million hot-rolled strip mill in operation.

The new addition will have a finishing capacity of 218,000 tons annually and will permit wider product diversification.

Union Hardware To Boost Sales

COMPLETION of its current $3.5 million plant construction program in April will enable Union Hardware & Metal Co., Los Angeles, to increase its future sales 40 per cent, officials estimate. Inventory increases to stock the new plant will run at least 20 per cent over current supplies, or a dollar increase topping $3 million.

Company is augmenting its sales staff to cover territory from Fresno, Calif., to the Mexican border, in addition to western Nevada and Arizona.

West Coast Utility Expands

PACIFIC Gas & Electric Co., the West Coast's largest power utility, will continue its program of plant expansion in 1950 at a level only slightly below the rate in 1949. Preliminary estimates are that cost of new construction this year will amount to about $175 million, compared with spending of $190 million last year.

The utility's current program of expansion began in 1945. Since that time approximately $500 million has gone into the effort to bring its facilities into line with current and prospective needs.

When the six-year expansion program is completed by the end of 1951, power generating capacity will be double the prewar total. It will mean the addition of 1,826,400 horsepower in new electricity generating plants for the six-year period.

When the current six-year program is completed, Pacific Gas & Electric is expected to start on another program to keep pace with demand.

Detroit Steel Elects Adams

AVERY C. ADAMS has been elected executive vice president and a director of Detroit Steel Corp., which took over the properties of Portsmouth Steel Corp. Jan. 3. Detroit Steel is completing plans for an electric weld pipe mill and a hot strip mill at Portsmouth, O.

Record of Steel Production in 1949

Estimated Production—All Companies

	Open Hearth Net tons	Open Hearth Per Cent of capac.	Bessemer Net tons	Bessemer Per Cent of capac.	Electric Net tons	Electric Per Cent of capac.	Total Net tons	Total Per Cent of capac.	Calculated weekly production Net tons	Number of weeks in mo.
1949										
Jan. ...	7,287,683	101.1	408,552	92.6	487,260	93.8	8,183,495	100.2	1,847,290	4.43
Feb. ...	6,633,779	102.0	379,698	95.3	467,247	99.6	7,480,724	101.4	1,870,181	4.00
Mar. ...	7,473,901	103.7	430,176	97.5	483,850	93.2	8,387,927	102.7	1,893,437	4.43
1st qtr..	21,395,363	102.3	1,218,426	95.2	1,438,357	95.4	24,052,146	101.5	1,870,307	12.86
Apr. ...	7,015,611	100.5	404,095	94.6	365,570	72.7	7,785,276	98.4	1,814,750	4.29
May ...	6,889,230	95.6	400,741	90.9	299,751	57.7	7,589,722	92.9	1,713,256	4.43
June ...	5,954,619	85.3	349,196	81.8	194,386	38.6	6,498,201	82.2	1,514,732	4.29
2nd qtr..	19,859,460	93.8	1,154,032	89.1	859,707	56.4	21,873,199	91.2	1,681,260	13.01
1st 6 mos. .	41,254,823	98.0	2,372,458	92.1	2,298,064	75.8	45,925,345	96.3	1,775,236	25.87
July ...	5,307,471	73.8	300,236	68.2	171,415	33.1	5,779,122	70.9	1,307,494	4.42
Aug. ...	6,101,499	84.7	355,335	80.6	257,910	49.7	6,714,744	82.2	1,515,744	4.43
Sept. ...	5,992,306	86.1	350,282	82.2	247,601	49.3	6,590,189	83.5	1,539,764	4.28
3rd qtr..	17,401,276	81.5*	1,005,853	76.9	676,926	44.0	19,084,055	78.8	1,453,470	13.13
9 mos. .	58,656,099	92.5	3,378,311	87.0	2,974,990	65.1	65,009,400	90.4	1,666,908	39.00
*Oct. ...	814,374	11.3	.....	...	111,059	21.4	925,433	11.3	208,901	4.43
*Nov. ..	3,805,730	54.5	172,270	40.3	238,262	47.4	4,216,262	53.3	982,812	4.29
†Dec. ..	6,952,669	96.7	396,075	90.0	361,104	69.7	7,709,848	94.6	1,744,310	4.42
†4th qtr.	11,572,773	54.1	568,345	43.4	710,425	46.1	12,851,543	53.1	978,047	13.14
†2nd 6 mos. .	28,974,049	67.8	1,574,198	60.2	1,387,351	45.0	31,935,598	65.9	1,215,668	26.27
†Total ..	70,228,872	82.8	3,946,656	76.0	3,685,415	60.3	77,860,943	81.0	1,493,305	52.14

Percentages of capacity operated are calculated on weekly capacities of 1,626,717 net tons open-hearth, 99,559 net tons bessemer and 117,240 net tons electric ingots and steel for castings, total 1,843,516 net tons; based on annual capacities as of Jan. 1, 1949, as follows: Open-hearth 84,817,040 net tons, bessemer 5,191,000 net tons, electric 6,112,890 net tons, total 96,120,930

* Revised. † Preliminary figures, subject to revision.

SAE Looks Ahead

To need for improved materials, closer co-ordination between engineer and manufacturer

U. S. "AUTOMOTIVE YEAR" accelerated to a fast and promising technical start with the 1950 annual meeting of the Society of Automotive Engineers in Detroit last week.

Tremendous scope of this national meeting, which attracted at least 5000, is indicated by the fact the 26 sessions involved 40 papers by 60 authors. In addition to general sessions, were 12 business meetings and 86 committee meetings, plus an unstated number of off-the-record "company parlor" receptions scattered throughout Detroit's downtown hotels. The usual exhibit of equipment and materials, in which a score or more manufacturers participated, was staged at the Book-Cadillac Hotel.

Analysis of the program reveals heavy emphasis on improved materials, on better co-ordination between engineering and manufacturing activities, on fuel and lubricant improvements and better engine economy, and on common-sense approach to body design problems. Automatic transmissions also came in for lively discussion. Aeronautical sessions were devoted more to civil than to military considerations.

Grass Roots Design—An interesting phase of tractor sessions was the tendency to consider design "from the grass roots" back into the machine. In other words, engineers lately have been making studies of behavior of the earth under the wheels and the treads of tractors, and have been designing their machines to cope with those conditions.

Incidentally, agricultural use of aircraft, including helicopters for spraying and dusting—came in for review. Speakers stressed the need for "agricultural aircraft," this apparently presenting a new and promising market for sturdy, low-cost machines.

Turbine Blade Study—In the realm of materials, some of the liveliest interest centered around papers having to do with gas turbines and turbojet power plants. G. Mervin Ault and G. C. Deutsch, National Advisory Committee for Aeronautics, in their review of NACA research on materials for gas turbine blades, set the present goal for practical operating temperatures at 3500° F. Extensive tests at speeds approaching 12,000 rpm at high temperatures are being run on materials such as stellite and vitallium.

One of the big causes of bad smashups is the wrecking of good blades by flying fragments of faulty blades. This emphasizes importance of pretesting and inspection before mounting. Their conclusions as to ceramic blades are that generally they are poor in ability to resist fracture when subjected to sudden and drastic temperature changes. Carbides seem to be superior to oxides in ability to resist fracture by thermal shock, but the carbides are poor in resisting oxidation.

JAMES C. ZEDER
. . . SAE's new president

Critical Shortages—Jerard M. Pederson, Aircraft Gas Turbine Division, General Electric Co., pointed out that the U. S. is in critically short supply of many of the metallic elements now considered vital in turbojet construction. He recommended prompt development of more plentiful substitute materials and revision of designs to employ the substitutes. Among the scarce elements he listed . . . columbium, cobalt, tungsten, chromium and nickel.

Other materials which came in for discussion were those for brakes, brake linings, brake drums and aircraft engine mountings. Ability of brake components to handle high heat now is a major consideration.

Process development—the link between engineering and manufacturing—was covered by R. J. Emmert, executive in charge of facilities and processing staff, General Motors Corp. He did this by an extensive exposition of the 90,000 square foot process development shop which now occupies rented quarters in the Cadillac plant. This includes a drafting room, laboratories, machine shop, heat treating plant and project shop. Here new methods are hatched, pilot model process machines are built and sample production lines are run.

One example of what has come out of this division, is the use of chopped up spring steel wire as a long-lived substitute for the metallic "shot" previously used for blast cleaning and shot peening. A chopping machine was developed for making these steel shot and peening machines were modified to use them.

Cross Country on a Tankful—In the field of fuel economy, R. J. Greenshields, director of research, Wood River Research Laboratory, Shell Oil Co., made the sensational statement that "150 miles per gallon is possible." This recently was proved with a family car operated under special conditions. While it was something of a "stunt performance," it did prove that there is a lot of room for better economy. The operating load factor of engines holds possibilities. So also do improvements in rolling and wind resistance factors.

New Officers Introduced — Guest speaker at the annual banquet on Wednesday evening was Gen. J. Lawton Collins, chief of staff, U. S. Army. At this event, which was attended by leading figures of the automobile, aircraft and tractor industries, S. W. Sparrow, retiring president of SAE, introduced the new officers for 1950-51. They are: President, James C. Zeder, who is chairman of the engineering board, Chrysler Corp.; new councilors, William E. Conway of Studebaker Corp., Philip J. Kent of Chrysler Corp., and Dale Roeder of Ford Motor Co.

Among the new vice presidents of group activities are Roy W. Roush, Timken-Detroit Axle Co., engineering materials; E. N. Cole, works manager, Cadillac Motor Car Division, passenger cars; R. F. Steeneck, Fafnir Bearing Co., production; W. H. Worthington, John Deere Waterloo Tractor Works, tractors and farm machinery; and W. P. Mitchell, Spicer Mfg. Division of Dana Corp., trucks and busses.

B. B. Bachman of Autocar Co. was re-elected treasurer, and John A. C. Warner as secretary and general manager.

May Build Two Blast Furnaces

NATIONAL Steel Co. of Brazil is considering expanding its steel plant at Volta Redonda, 90 miles from Rio de Janeiro. The company has one blast furnace there now and wants to build two more. An American engineering firm is figuring the job.

Windows of Washington

Washington bureaucrats, eager for opportunities to shine in public service, are agog over U. S. Steel's purchase of 3800 acres as a site for future seaboard steel mill

U. S. STEEL Corp.'s 3800 acres near the Delaware river north of Philadelphia bought for possible future use as a site for a steel plant has caused a stir in more than Washington teacups.

In conferences galore, in interdepartmental meetings, in investigative assignments to economists and other government workers, the steel corporation's decision has already consumed countless man-hours paid for—naturally—out of taxes.

One government man facetiously remarks: "We may decide to make a project out of this thing."

For many reasons the steel corporation's action is of prime interest to the government. Many officials are rubbing their hands with a little less glee than a witch around a boiling cauldron. Based on the assumption that U. S. Steel will build a seaboard steel mill, these are some of the implications of public interest—as the government people see it:

The move represents a further dispersion of the steel industry away from the traditional centers—a logical consequence of the pricing philosophy of the Federal Trade Commission as upheld by the courts and as such, highly desirable.

Selection of the site on the Delaware river envisions use of foreign iron ore. That is desirable from several standpoints: It will enable supplier countries to get more dollars, it will help conservation of our domestic ore reserves, and it will necessitate the addition of a substantial fleet to our merchant marine.

Decision to build a plant on the Delaware river effectively reduces the likelihood that an integrated steel plant will be located in New England in the forseeable future. That's not so good.

The Delaware river location is an ideal one from the standpoint of exporting steel, an activity in which the steel corporation historically has been predominant. That's good because a certain amount of steel exports always will be needed to facilitate the President's Point Four program.

The move efectually proves U. S. Steel management has faith in the future of the country and believes that its living standards will be still further improved in the future. Very good.

To the Department of Defense the move means two things: Primarily, it will be still an additional source of vital steel in the event of a future war emergency. But it will create a new defense problem, particularly for the Navy and the Air Force. Preliminary comment indicates that this will be the same kind of a problem that already exists for all critical manufacturing establishments.

The steel corporation's decision, while originating entirely with a privately owned interest, actually represents a move in the direction of increased steel capacity as demanded by many government, labor and other economists in the immediate postwar years—thus proving that these thinkers were right.

The move will serve to maintain U. S. Steel's position as the dominant interest in the steel industry from the standpoint of size; it will tend to keep this interest in the public eye as a "big" industrial aggregation. On the other hand, location of the new plant north of Philadelphia will mean more competition in the areas in which it will seek business—and that is all to the good. Thus, in the eye of law enforcement officials, the situation will need watching.

A congressional staff economist told STEEL he is curious to know if a new plant would be paid for from the sale of securities or, in part, from accumulated profits. That factor is seen to be of special importance since a big outlay would be entailed. No official cost estimates have been revealed. Capital gossip is that a seaboard plant, depending on its scope, could cost as much as $1 billion. The questions are: Are present steel prices higher than would be the case if the supply of risk capital were larger? Are steel consumers paying for new steel plant construction on a short-term rather than on a long-term basis as used to be the case in the days when more investors were willing to put their savings into industrial ventures? It is expected that this particular question will be explored when Benjamin F. Fairless, president of U. S. Steel, appears next week before the Joint Congressional Committee on the Economic Report to explain the reasoning behind the recent advance in steel prices (see page 28).

No Dry-Docking Necessary

IF CONGRESS grants necessary funds this year, the Maritime Commission plans to install magnesium anodes alongside half of its 2200 merchant vessels by June 30, 1951. The remaining 1100 ships would receive this cathodic treatment (STEEL, Dec. 5, p. 68) by June 30, 1952.

Cathodic protection is given the ships by attaching an electrically charged cable to a magnesium anode and suspending it over the side of the ship to protect the hull from salt water corrosion. The technique does not require the ships to be dry-docked. Cost of protecting 2220 vessels for 20 years by the cathode technique, the commission says, would come to $26.4 million; by sandblasting and painting, in government dry docks, $50 million.

Man-Hour Productivity Gains

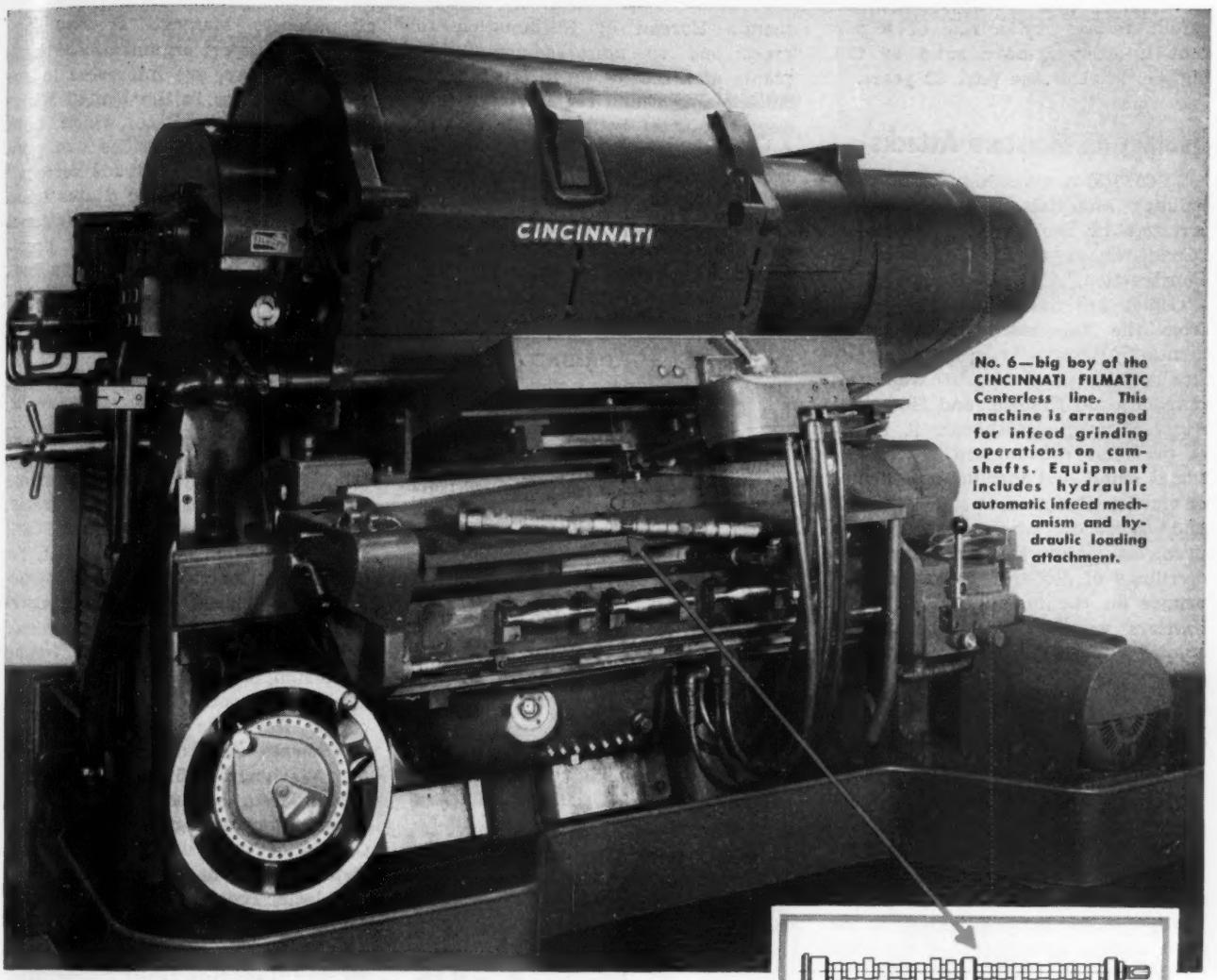
EFFICIENCY of labor, as measured by man-hour productivity, has gained dramatically since 1946 in these metalworking industries: Industrial electrical machinery, construction machinery, general industrial equipment, mining machinery, metal forming equipment other than machine tools, and railroad freight cars.

But man-hour productivity scored little improvement in industries manufacturing machine tools, household electrical appliances and radio receivers.

Those are the general findings in the latest productivity studies of the Bureau of Labor Statistics. Detailed reports on these industries have been completed and are scheduled to be made public, after review, at intervals over the next two months.

BLS has near completion, for the first time, an index of man-hour productivity in the basic steel industry. It is trying to work out a formula for measuring productivity of primary fabricated nonferrous products—sheets, rods, wire, etc.

Just released is a BLS study showing that man-hour output in the privately owned electric light and power industry rose 2 per cent in 1948, as compared with 1947. This improvement was accompanied, and to some



No. 6—big boy of the CINCINNATI FILMATIC Centerless line. This machine is arranged for infeed grinding operations on camshafts. Equipment includes hydraulic automatic infeed mechanism and hydraulic loading attachment.

Direct from Foundry

TO 75 hp FILMATIC CENTERLESS GRINDER

A manufacturer of automobiles saves in three ways by routing camshafts direct from the foundry to a 75 hp CINCINNATI FILMATIC No. 6 Centerless Grinder:

1. Higher production and lower cost per piece than other methods, removing ⅛" on diameter
2. Accuracy of straightness retained
3. Close accuracy of alignment between three ground diameters

These machines, the most powerful of any centerless built, have the power and stamina to quickly grind away conventional stock allowances from rough castings. Of course, they are not limited to this type of work. They handle any precision cylindrical grinding operation requiring rapid stock removal and/or extra wide wheels, often replacing other methods. Our Grinder Application Engineers are at your service to help you investigate the cost reducing possibilities of these machines. Write to Department E. S., enclosing blueprint.

PRODUCTION DATA

Part name.....Camshaft
Material.....Castoloy
Operation.....Grind three main bearing diams. and pilot diam.
Method.....Infeed
Stock removal..... ⅛"
Production..... 34 per hour

MACHINE SPECIFICATIONS

SIZE No. 5

Capacity, diam..... 1"—7"
Maximum length infeed cut..... 32"
Grinding wheel..... 24" OD x 12" ID
Grinding wheel motor.....up to 75 hp
FILMATIC Grinding Wheel Spindle Bearings.

SIZE No. 6

Capacity, diam..... 1"—10"
Maximum length infeed cut..... 32"
Grinding wheel. 30" or 36" OD x 12" ID
Grinding wheel motor.....up to 75 hp
FILMATIC Grinding Wheel Spindle Bearings.

CINCINNATI GRINDERS INCORPORATED

CINCINNATI

CINCINNATI 9, OHIO, U. S. A.

CENTER TYPE GRINDING MACHINES • CENTERLESS LAPPING MACHINES • CENTERLESS GRINDING MACHINES

extent caused, by a rise of 8 per cent in kilowatt-hour sales to the highest level of the past 32 years.

Booklet on Moisture Attacks

IF YOU'RE a manufacturer of steel building materials, you may be interested in the 74-page pamphlet, "Condensation Control in Dwelling Construction."

Copies are available at 20 cents from the Superintendent of Documents, U. S. Government Printing Office, Washington 25. It was prepared by the Housing and Home Finance Agency. Although it treats of problems encountered in conventional small and medium-size homes of wood contruction, it shows by text and sketches where condensation problems occur in tight, insulated dwellings of modern design. It is a primer on the installation of vapor barriers, ventilation and thermal insulation to prevent structural deterioration by moisture.

More Aid Sought for Highways

MORE FEDERAL aid for highway construction will be sought from Congress at this session.

The American Association of State Highway Officials wants the government to appropriate $810 million annually for this purpose instead of the $450 million already voted for each of the fiscal years 1950 and 1951. Of the $810 million, $210 million would be earmarked for the Interstate System, $270 million for the Primary Road System, $180 million for the Secondary System, and $150 million for the Urban System.

The present $450 million annual appropriation breaks down into $202.5 million for primary, $135 million for secondary and $112.5 million for urban projects.

Drinking Water from the Sea?

WATER SHORTAGES in various areas, particularly in New York and the Virgin Islands, have stepped up interest in Sen. Joseph C. O'Mahoney's bill to stimulate research in conversion of sea water to potable water.

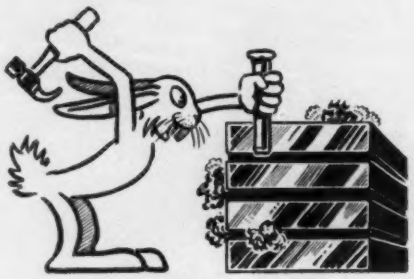
His theory is that such a development would tend to relieve the drain on water resources by enabling seaside communities to supply their requirements from the ocean—at least in periods of emergency. He has instructed the staff of the Senate Committee on Interior and Insular Affairs to obtain all existing pertinent information and report it to the committee.

The pending measure, S. 1300, would authorize the Interior Department's Bureau of Reclamation to erect one or more demonstration plants at a cost of up to $50 million. Such plants would require large tonnages of steel both in finished and fabricated forms. Backers of the measure believe that net costs can be brought within reasonable bounds by figuring in the value of mineral salts and other sea-water components that would be reclaimed as by-products.

Sheet Steel Lettuce Crates

DON'T BE SURPRISED if one of these days you pass a vegetable market and see lettuce being taken out of a sheet steel crate.

Such crates are among those being studied in a search for improved containers and loading methods for



shipping fresh vegetables by rail. The manufacturer of the metal lettuce crate is Salinas Metal Crate Co., Salinas, Calif.

Studies are being conducted under direction of Dr. R. W. Hoecker, chief, Transportation Research Division, Marketing Facilities & Research Branch, Production & Marketing Administration, Agriculture Department. Working with Dr. Hoecker in the campaign is C. B. Moore, secretary-managing director, Western Growers Association.

Preliminary findings on the lettuce crate show no deterioration in vacuum-cooled lettuce shipped and that steel crates are cheaper than wood crates.

Sales Group To Meet in London

WHAT SALES principles and methods can we adopt with advantage from the British?

That question arose at the Economic Cooperation Administration in connection with the coming trip of 12 members of the National Sales Executives for a meeting to be held in London Mar. 13 and 14. The British and American sales executives there will tell each other how they do their selling jobs. Although the sales executives will pay their own way, Paul Hoffman, ECA administrator, thinks so well of the mission that he held a press conference at which the American team leaders discussed the overall purpose. Many U. S. manufacturers and export organizations, these spokesmen say, are interested in soliciting business in the United Kingdom and in areas to which both groups sell—so both sides can gain from an exchange of "trade secrets."

Leaders of the United States team are E. A. Whitney, president, National Sales Executives, Don Mitchell, president, Sylvania Electric Products Inc., and Arthur H. Motley, Parade Publication, chairman of the NSA board. The U. S. team will be the guests of the British Incorporated Sales Managers Association.

Need a Guide for AEC Business?

MANUFACTURERS who do business with the Atomic Energy Commission, or contemplate such business, will want a copy of the new booklet, "A Guide for Contracting of Construction and Related Engineering Services," prepared by the commission.

It outlines AEC policy in letting lump-sum, fixed-price, and cost-plus-a-fixed-fee contracts. You can get copies from the Superintendent of Documents, Government Printing Office, Washington 25, for 10 cents. The booklet is a companion to that entitled "Contracting and Purchasing Offices of the Commission and the Types of Commodities Purchased;" the latter booklet was issued last August and also costs 10 cents.

Water Pollution Fight Intensified

FIGHT by the federal government against water pollution is to be intensified under L. F. Warrick, newly appointed chief of technical services, Water Pollution Control Division, U. S. Public Health Service.

Three principal projects, that were just getting started when the steel strike interrupted in October, are concerned with pollution caused by steel mill wastes. Work on them is to be resumed, at Buffalo and Lackawanna, N. Y., and Middletown, O., with co-operation by Republic Steel Corp., Bethlehem Steel Co. and Armco Steel Corp., respectively.

A fourth project concerns pollution of the Detroit river; work has advanced to a stage where a report on field studies now is being prepared for submission to the United States-Canadian International Joint Commission on Boundary Water Pollution.

Mr. Warrick has had long experience with the pollution problem as former Wisconsin state sanitary engineer and as executive secretary of the Wisconsin Committee on Water Pollution. In his new post he will work closely through the Health Service's field organization.

British, French Tax Takes High

State collected 40 per cent of France's total national income in 1949. United Kingdom took 38.3 per cent; United States 23.7 per cent

IF YOU'RE tired of paying a fifth or more of your income in taxes, consider the fatigue of British and French taxpayers.

The state collected 40 per cent of France's total national income in 1949 (see chart). About 30 per cent came from taxes and 10 per cent from social security. The take rose from 22 per cent in 1946, to 28 per cent in 1947, to 31 per cent in 1948. In the United Kingdom, levies were 37.8 per cent of national income in 1946, 37 per cent in 1947, 38.5 per cent in 1948 and 38.3 per cent in 1949. In the United States federal levies fell from 30 per cent of national income in 1946, to 26 per cent in 1947, to 24.5 per cent in 1948, to 23.7 per cent in 1949.

U. K. Collects from Industry

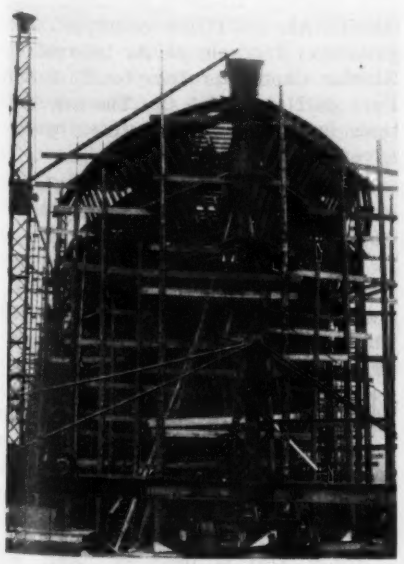
You can beat the British tax collector only if you're a gambling winner, an amateur stock market operator or dead.

Gambling winners aren't taxable because the government has found from experience that it can't collect. The same goes for earnings by amateur stock market operators. Although the government can't tax the dead, it gets revenge on the bereaved relatives. If the deceased left assets worth $28,000, the government gets 4 per cent. If he left $280,000, it gets half.

But where the Treasury really collects is from industry. Take a typical steel company, Dorman, Long & Co. In 1949 it paid $6,720,000 in taxes and was left only $4,760,000 to strengthen its reserves and pay dividends to shareholders.

High taxes are one of the complaints of the shipbuilding industry. Work now on order will keep yards fairly busy until the end of 1951, but by then the outlook is dim. The industry claims it should be able to amortize its profits over a five year period to cushion the bad spots. Employment in the industry now stands at 129,688, but is expected to fall to 90,000 soon.

High taxes are strangling the domestic market for automobiles, manufacturers say. The government is keeping its high excises on domestic sales to encourage exports. Many makers say this is short-sighted thinking. A strong home market, they believe, must be nourished to support the industry once the inevitable slackening occurs in export sales. About 150,000 cars and 110,000 trucks were sold to Britons in 1949. In 1950, only an estimated 110,000 cars and 81,000 trucks will be sold in Britain. Fewer tax-burdened citizens can afford them this year.



U. K. SHIPBUILDING
. . . high taxes one complaint

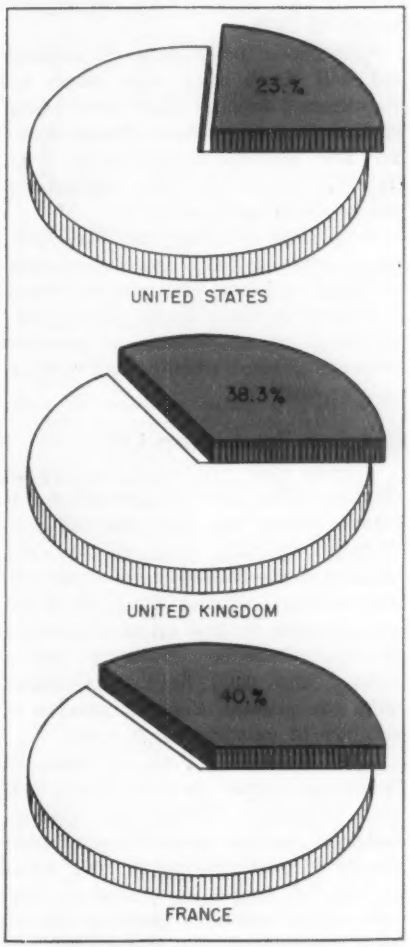
France To Balance Budget

Prime Minister Georges Bidault of France is committed to balancing the budget for 1950. To do this, he must collect $223 million more in taxes this year.

Proposed new sources of government income would come from new or additional industrial taxes. A proposed 10 per cent tax on nondistributed profits is expected to bring in more than $48 million. It would be calculated after deducting from gross profits the 24 per cent income tax, the legal reserve, permitted payments for equipment and stock, interest on capital and distributed profits. A production tax would be raised from 12.5 per cent to 13.5 per cent of value of output. The payment by the employer of his employees' income tax would be raised from 5 per cent to 6 or 7 per cent of the total wage bill.

The government will economize by limiting its investments in nationalized industries in 1950. No income from taxes will be used for this purpose, only money from the Marshall Plan counterpart fund and from the loan of January, 1949.

One source of income for the French government that has been steadily rising is in sale of lottery tickets. The government made over $6 million in 1948; this sum increased in 1949.



Central Government's Tax Take in 1949
(Percentage of National Income)

Ruhr Output Soars in 1949

The Ruhr's industrial production soared in 1949. Here's what happened in three basic products (production for 1936 is estimated by calculating output for that year in the area that is now Western Germany):

	1949	1948	1936
Coal (net tons)	113 million	96 million	151 million
Steel ingots (net tons)	10.5 million	6.3 million	19.9 million
Autos, trucks (units)	163,000	142,000	170,000

Total employment in coal mines has surpassed the prewar level and has reached 461,000. About one-third of all coal mines still operate in the red because of low, Allied-controlled prices.

Output per man-hour in the steel industry has increased greatly. Total employment amounts to 370,000 now. Nobody doubts that the industry can

produce 12.2 million tons, the official target, in 1950.

Automobile production is soaring and will climb even more when an installment buying plan now being studied is inaugurated. Some makers are manufacturing more than they did before the war. Prices are due to come down soon.

A housing program for West Germany promises to aid the Ruhr metalworking industry. The republic needs 5 million dwelling units. Mass construction of apartments is required because of bomb damage and population growth.

Belgian Production Off

Belgian steel production is slipping further. The end of controlled domestic prices late last year spurred demand slightly, but not to the heights of the immediate postwar era. Belgians are pinning their hopes for an economic revival on an expansion of the Benelux economic union. France and Italy have participated with the present Benelux nations in a study of existing tariff walls.

The Marshall Plan system of "drawing rights" is also aiding Belgian industry. Under the system, Belgium makes available to other countries participating in ERP sums in Belgian francs equivalent to certain dollar amounts granted her by ECA for purchase of goods from the dollar area. Countries which would otherwise be short of Belgian francs can continue their Belgian purchases.

Machinery Exports Aid Italy

Bright spot in Italy's export picture last year was agricultural machinery. Shipments abroad jumped 300 per cent from 1948.

In the first nine months of 1949 Italy produced 56,826 cars and trucks, of which 42,672 were autos. Production in 1949 was running at a rate 38 per cent better than in 1948. Fiat alone is producing 350 vehicles per day.

Tito Goes Westward

Yugoslavia is inching more toward the West. It has signed a trade agreement with Britain whereby the two countries will exchange $560 million worth of goods in the next five years. Britain will buy timber, corn, lead and copper from Yugoslavia. Britain will sell to the other some of the machinery and chemicals that Russia was supposed to have supplied but didn't; also wool, cotton and rubber.

Marshal Tito also has a one-year trade agreement with West Germany. To top it all off, the marshal could report a treasury surplus at the end of 1949.

Extrude Alloy Steels

French process for hot-forming complex shapes soon to be introduced in U. S.

A NEW French steel process soon to be introduced to America promises to lower costs or improve quality in many familiar metal products.

Developed by Societe d'Electro-Chimie, d'Electro-Metallurgie et des Acieries Electriques d'Ugine and its subsidiary, Comptoir Industriel d'Etirage et Profilage de Metaux, the process is called the Ugine-Sejournet method to hot-form shapes and sections. The process may open a new era of mechanical design, giving machine builders forms and materials that they couldn't use before.

Developed Secretly in War—The technique was developed secretly during the war by Ugine engineers and scientists. The process was perfected in 1945 and used commercially last year to fabricate tubes and extruded sections of all types in many alloy steels. Users of the process claim that many heavy carbon steel parts may be replaced by lighter, longer lasting components of stainless steel at equal or lower cost.

The process uses a modified form of hydraulic press and permits continuous hot-forming of shapes that cannot be made in rolling mills because of their complex profiles. The technique also permits shaping of certain tough alloy steels that are difficult to process in rolling mills because of the molecular structure of the metal.

Greater Precision Possible — The process permits fabricators to know the exact deformation temperature of the metal, an essential factor for some alloy steels. The method can also be used to make shapes that aren't produced in sufficient volume to justify rolling mill production. On a single hydraulic press a quick and inexpensive change of dies permits a fast and cheap production shift from hollow tubes, say, to solid bars.

New Way To Make Steel Itself—While the Ugine-Sejournet process simplifies manufacture once the basic steel has been made, another new method, the Ugine-Perrin technique, goes one step further: It is a faster way to make steel itself. Soon to be tested by Vanadium Corp. of America, it may solve the troublesome sulphur problem in steel rolling.

In this process, steel is considered a chemical and is made to react by emulsification with a synthetic slag to eliminate oxygen and sulphur. Ugine rapidly melts a steel charge of 25 tons without considering the degree of oxidation of the bath. Refining time is nearly eliminated and is replaced by the flow of liquid steel into a vessel containing the Perrin synthetic slag so that both sulphur and oxygen removal is instantaneous and predictable. The technique cuts the time required from cold charge to ingot teeming by 2 to 2½ hours.

French application of the process to the basic bessemer steel converter gives a high quality heavy stamping sheet steel; applied to open-hearth furnaces, it permits mass production of the same qualities of high grade steels now made in other furnaces.

Perimeter Heating for Houses

PERIMETER heating for ranch-type homes is being used in a large housing project in Chicago. The method, developed by the University of Illinois, employs metal ducts encased in concrete beneath a 4-inch floor slab. Ducts are run around the foundation wall and connected with the heating unit near the center of the building.

Warm air is driven through the ducts by an aluminum bladed fan operated from an oil-fired heating unit 27 inches square and 5 feet 4 inches high. About 70 per cent of the heat radiates through the floor and the rest is circulated through registers. Cold air intakes are near the top of the walls, 8 inches from the ceiling. The theory of the perimeter method is that cold air is pushed up by the rising heat.

Cost of the new heating system is about $600, including cost of the concrete for encasing the ducts. The fan is operated by a ⅛-horsepower motor.

GM To Sell Kinetic Interest

GENERAL MOTORS concluded negotiations for sale of its interest in Kinetic Chemicals Inc. to E. I. du Pont de Nemours & Co. The negotiations had been underway for nearly a year.

Completion of the sale awaits only action by the Securities & Exchange Commission on Du Pont's application to buy GM holdings in Kinetic. Approval is required under the Federal Investment Company Act of 1940. The sale price agreed upon is about $9.7 million.

Kinetic was founded in 1930 by Du Pont and GM to manufacture nontoxic, noninflammable "Freon" fluorinated hydrocarbon refrigerants. Du Pont held 51 per cent of the stock and GM 49 per cent.

Freon also is used in "Aerosol" bombs used for dispensing insecticides.

Business Opportunities

For metalworking seen in reinforced plastics. Strides shown at Cleveland exhibit

BUSINESS opportunities for metalworking exist in the newest segment of the plastics industry—reinforced plastics.

This was shown at the fifth annual technical session and exhibit of the Reinforced Plastics Division of the Society of the Plastics Industry, held in Hotel Cleveland, Cleveland, Jan. 10-12.

Produced Since the War — Reinforced plastics have been produced commercially only since the end of the war. Today about 75 companies are making products ranging from boats to airplane components to luggage to tops for kitchen sinks. None of these things could be made without metalworking equipment—ovens, handling apparatus, presses, molds and dies.

If you're worried about competitive inroads into metal sales made by reinforced plastics, rest easily. Yes, fabricators in isolated instances have switched from a metal to reinforced plastics, but the most widespread applications thus far found for the material supplant wood, rubber, fiber, leather and paper. The few metal losses will be more than made up for by gains in sales of machinery to form the plastic products.

Fillers Used—Reinforced plastics are molded or formed items and laminates. Fillers of paper, cloth, glass or other materials are added to cut the cost of the plastic and to add various characteristics to the material.

Conventional plastics products are made by presses. Reinforced plastic items are made in molds without pressure or by low pressure continuous laminating. This is done by taking a roll of paper—say—running it through a bath of resin, laying it on a printed pattern and then running it through an oven to cure it. Large plastic sheets can be made in this manner.

Metalworking's role in this new industry is in the development and manufacture of new and better ways to make molds, ovens and machinery to add the filler materials to the resin. Cheaper and better machinery mean cheaper reinforced plastics which mean more plastics sales which mean more machinery sales.

The reinforced plastics segment of the industry is the newest and the fastest growing. The entire industry used 213 million pounds of synthetic resins in 1939, 1480 million in 1948 and an estimated 1.5 billion in 1949. The entire industry expects to do better than $1 billion business in 1950.

Armco Plans Celebration

PLANS are being completed for the celebration of Armco Steel Corp.'s 50th anniversary. The first little steel plant was built on the site of an abandoned ice pond in Middletown, O., and that city still houses the company's home office.

Since its beginning with one small plant employing 325 people, Armco has grown to become one of the nation's major steel companies with plants and offices all over the world. It now employs about 30,000 people. The number of stockholders has risen from the original 35 to 44,500.

During its first year of operation, Armco produced 10,000 tons of steel; today its annual capacity is 3,793,000 tons and if new open hearths are completed late this year ingot production will be raised another 400,000 tons. Payrolls in the first year of operation were $196,000, in 1949 they were almost $100 million.

Suggestions Pay $5 Million

GENERAL MOTORS Corp. employees have received more than $5 million in awards since the company inaugurated its suggestion plan on a company-wide basis in April, 1942. In the intervening period more than 559,000 suggestions have been turned in, about 23 per cent were found to be usable.

Maximum award under the GM suggestion plan is a $1000 U. S. Savings Bond. During the nearly eight years of the plant's operation 600 maximum awards have been distributed with some employees getting as many as three top awards. Average award is $39.23 in a wide range of subjects such as improvements in methods or processes, savings in material and labor and reduction of accident, fire and health hazards.

Original Employees Honored

CLARENCE SNYDER, founder and chairman of the board, Snyder Tool & Engineering Co., Detroit, and William Vollmer and Alvin Odgers, the company's first employees, were presented with diamond-crusted 25-year service pins at Snyder's Silver Jubilee banquet.

Snyder Tool & Engineering was founded as a builder of special machine tools and in the last year bought Arthur Colton Co. in order to diversify its line by adding pharmaceutical production and packaging machinery.

CALENDAR OF MEETINGS

Jan. 16-18, Truck-Trailer Manufacturers Association: Meeting, Edgewater Gulf Hotel, Edgewater Park, Miss. Association headquarters are at 809 National Press Bldg., Washington.

Jan. 16-19, Plant Maintenance Show: Sponsored by American Society of Mechanical Engineers and Society for the Advancement of Management, at the Public Auditorium, Cleveland. Mechanical Engineers' headquarters are at 29 W. 39th St., New York.

Jan. 18, American Society of Body Engineers: Annual dinner meeting, Detroit Leland Hotel, Detroit. Society headquarters are at 100 Farnsworth, Detroit.

Jan. 18-20, American Management Association: Conference on management problems, in San Francisco. Association headquarters are at 330 W. 42nd St., New York.

Jan. 18-20, American Society of Civil Engineers: Annual meeting, Hotel Commodore, New York. Society headquarters are at 33 W. 39th St., New York.

Jan. 19, American Iron & Steel Institute: Regional technical meeting, Hotel Statler, Buffalo. This meeting originally was scheduled for last Sept. 29, but had to be postponed because of the impending steel strike.

Jan. 20, Malleable Founders' Society: Semi-annual meeting, Hotel Cleveland, Cleveland. Society headquarters are in the Union Commerce Bldg., Cleveland.

Jan. 22-24, Institute of Scrap Iron & Steel Inc.: Annual convention, Hotel Statler, Washington. Institute headquarters are in the Dupont Circle Bldg., Washington.

Jan. 23-24, Industrial Furnace Manufacturers Association: Meeting, Dearborn Inn, Dearborn, Mich. Association headquarters are at 420 Lexington Ave., New York.

Jan. 23-26, Institute of Aeronautical Sciences: Annual meeting, Hotel Astor, New York. Society headquarters are at 2 E. 64th St., New York.

Jan. 23-27, National Sand and Gravel Association: Annual convention, Stevens Hotel, Chicago. Association headquarters are in the Munsey Bldg., Washington, D. C.

Jan. 23-27, American Society of Heating & Ventilating Engineers: Southwest air conditioning exposition, State Fair Park, Dallas. Society headquarters are at 480 Lexington Ave., New York.

Jan. 30-Feb. 1, American Material Handling Society, Chicago Chapter: Midwest material handling conference, in conjunction with Illinois Institute of Technology, in Chicago.

Jan. 30-Feb. 1, National Crushed Stone Association and **Agricultural Limestone Institute:** Convention and Manufacturers Division Exposition, Stevens Hotel, Chicago. NCSA headquarters are at 1735 14th St., Washington, D. C.

Feb. 2-3, Electric Maintenance Engineers of Milwaukee: 11th annual industrial electrical equipment exposition, at the Public Service Bldg., Milwaukee.

Feb. 2-3, National Industrial Advertising Association and **Industrial Advertising Council of Pittsburgh:** Pittsburgh industrial advertising exposition, Hotel Roosevelt, Pittsburgh. General chairman of the event is Roy R. Mumma, 436 Seventh Ave., Pittsburgh.

Feb. 3, Open-Hearth Committee, Eastern Section, AIME: Meeting in Philadelphia. This conference was originally scheduled for last Oct. 14, but was postponed because of the steel strike.

Feb. 7-9, Ohio Hardware Association: Exposition, Public Auditorium, Cleveland Association headquarters are at 175 S High St., Columbus, O.

Feb. 9-10, American Foundrymen's Society, Birmingham Chapter: Regional conference, Birmingham. Society headquarters are at 222 W. Adams St., Chicago.

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Younger In Vision

With well over half a century of achievement behind us . . . and entering another year of progress . . . we wish to heartily thank all our friends for the generous cooperation which has made the application of Hyatt Roller Bearings so extensive.

Letting the past speak proudly for itself... we are facing tomorrow's tasks with even greater confidence.

Be assured of this...the initiative of Hyatt design engineers...the continuing research and testing by Hyatt laboratory technicians... the skill of Hyatt craftsmen...the resourcefulness of the entire Hyatt organization are all at work making still better bearings for the equipment you build or buy.

With the past proof of partnership through the years, we can safely say for 1950..."Look to Hyatt for the best in roller bearings." Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.; Chicago: Detroit; Pittsburgh; and Oakland, Calif.

HYATT ROLLER BEARINGS

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Review of research into automotive fuels and engines highlights SAE convention. Engine efficiency raised at least 30 per cent in past 20 years

DETROIT

FORMAL convention programs and their often tedious technical dissertations are apt to be pretty drab affairs to the visiting firemen who may prefer the off-hours coffee klatches in "company suites" scattered through out the hotels. Probably some choice stories, automotive and otherwise, were unloaded on the 6000 engineers at the SAE meeting here last week in the various dispensaries of the Book-Cadillac's upper reaches, yet for sheer drama none could have surpassed T. A. Boyd's tabloid review of 30 years' research into automotive fuels and engines. Associated with General Motors research laboratories division, Mr. Boyd's paper was designated the Horning Memorial Lecture and for it he was awarded a memorial medal by the widow of the late Harry Horning, one of the first to recognize the importance of fuels in relation to design and behavior of engines.

The fuel-engine "scientific fox hunt" detailed by Mr. Boyd began in 1916 under direction of C. F. Kettering and associates, using a single-cylinder air-cooled engine, a British optical indicator, two pieces of lath, two shingle nails and a tomato can. They wanted to find out for sure what made engines knock. Their first photographic cards proved that spark knock, as it was then called, does not come from pre-ignition at all. Rather it is a violent pressure disturbance which comes after ignition by the spark plug. That was just the beginning.

Many Groups Co-operated—The research sprouted in many directions and brought in co-operative groups like the Bureau of Mines, Army Air Force technicians, university laboratories and chemical companies. It banged up against one stone wall after another, often to within an ace of being junked altogether. Each time, however, some small discovery or apparently unrelated test proved to be catalyst to keep the program going. What was wanted was a suitable additive which would suppress knock and literally thousands of different materials and compounds, natural and synthesized, were tried, all the way from the foul-smelling diethyl selenide and telluride to the ultimately successful tetraethyl lead. When the going was particularly rough, one authority wrote, "I doubt if humanity, even to doubling their fuel economy, will put up with this smell."

Bouncing Pin Test—An interesting corollary of the long battle was the development in 1921 of the bouncing-pin indicator for quantitative measurement of engine knock. Essentially it is a free pin held loosely in a guide and arranged so its lower end can be placed on some part of the engine's cylinder head. When knock is not present the pin merely follows the small flexing of the cylinder head. When knock occurs the head flexes so violently the pin is thrown free of contact and may jump as high as 2 inches.

Bromine Taken from Sea — Tetraethyl lead was not the entire answer, since it left deposits in the combustion chamber resulting in serious exhaust valve burning. Something more was needed. It proved to be an organic compound of bromine or of bromine and chlorine. Where to get the bromine? Sea water had 65 parts bromine per million. You could get a pound out of ten tons of water. The Du Pont company moved in and under contract with Ethyl Corp. fitted out a pilot plant and erected it on board ship to get away from possible sediment or fresh water contamination. The entire operating personnel was laid low with seasickness, but the equipment worked. It pointed the way to the current commercial method of extracting many millions of pounds of bromine from sea water each year.

Another high hurdle was the scare which developed over lead poisoning. Months and months of more experimenting and test, first on animals and then on humans, knocked that one down. An early test with dogs in a large chamber exposed several hours daily to exhaust fumes from an engine running on leaded gas showed "no indication of plumbism". One day a litter of five puppies was born in the chamber and survived.

Revolution in Refining — Worth of the knowledge gained from all the research of the past three decades, explains Mr. Boyd, is so extremely large that it perhaps cannot be computed. Through what it has done to stimulate catalytic cracking, polymerization, isomerization, alklyation and other new forms of petroleum processing, it has helped to bring about the modern revolution in petroleum refining.

Practical Values — Consider that since 1930 the efficiency of the av-

AMERICAN INFLUENCE ON GERMAN CAR: The German automobile industry is operating with American speed and efficiency in Western Germany. The new Hansa 1500, manufactured by Carl F. W. Borgward Automobile & Motor Works in Bremen, also shows a Yankee influence

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erage automobile engine, measured in ton-miles per gallon, has been boosted by at least 30 per cent. On the nation's gasoline bill that represents a yearly saving to the public of more than $2 billion, in terms of conservation of petroleum resources, the equivalent of 1500 oil wells each bubbling 1000 barrels a day.

Beyond that research on the high-compression engine (12.5 to 1) points to another 30 per cent gain in economy. Finally, as Boyd concludes, even this is probably not the end at all.

Ford To Build at Cleveland

FORD still will not discuss the subject officially, but local sources in Cleveland regard it a certainty the company is proceeding with plans for a $100 million production foundry and engine assembly plant there on a 200-acre site in the southwest section of the metropolitan area. The plant will cover about 17 acres and will provide jobs for something like 8000. Also reported to have been acquired is dock space for unloading of pig iron, coke and other raw materials, as well as shipment of finished engines and castings.

It is doubtful the project could be completed and in operation much inside of two years. Important changes will result, however, in the present Ford manufacturing setup. The large production foundry at the Rouge plant would appear destined for a minor role, perhaps even oblivion. That would free the Ford blast furnaces from the duty of supplying hot metal to the foundry and would permit their full integration with open hearths and steel mill to the end the entire Ford iron and steel "package" could be disposed of—Bethlehem Steel long having been rumored an interested bidder.

With a foundry and engine plant at Cleveland and a new pressed steel plant at Buffalo, Ford looks to be a good bet to take to the water in future years in the inter-shipment of parts and subassemblies between Detroit, Cleveland and Buffalo. Rail shipment of automatic transmissions from a new Cincinnati plant would tie in with the lake port activities, as well as handling output of forgings from the recently established Canton, O., plant.

Manufacturing operations at the company's Flat Rock, Mich., plant —head lights, tail lights, and parking lights—will be transferred to a production unit acquired last October at Monroe, Mich., as soon as space becomes available. Facilities are still being used to some extent by the former owner, Kelsey-Hayes Wheel Co., and as it clears out, other Ford operations will move in, one being a large die casting division.

Detroit Sees "X" Model

A LARGE share of the cream of the automotive industry's executive talent, along with bankers, brokers, suppliers and the press, swarmed into the Detroit Golf Club last Monday to catch a glimpse of the Nash "X" job, described in these columns a week ago. Floodlights glared, refreshments flowed and a bounteous buffet dinner was served. George Romney, assistant to Nash president George Mason, mounted the dais to describe essential features of the small prototype car, while top brass from General Motors, Chrysler, Packard and Ford listened in polite silence. For the ostentation of the "surview" as Nash called it, the company officials showed a marked degree of unenthusiasm perhaps even a deliberate negative approach.

Invites Criticisms—Here it is, they said. We know there are a lot of things wrong with it. It can never compete in the mass passenger car market. Go ahead, pick it to pieces. Please tell us why we are crazy even to think of producing it.

Why this unusual technique of showing off a new idea? One old Nash dealer laughed, slapped his thigh and said here was his company getting front page publicity for a car it didn't even plan to build, while other manufacturers were pulling all the stops to get even scant mention of their new 1950 jobs. It was too good to be true.

Auto, Truck Output

U. S. and Canada

	1949	1948
January	445,092	422,236
February	443,734	399,471
March	543,711	519,154
April	569,728	462,323
May	508,101	359,966
June	623,689	454,401
July	604,351	489,736
August	678,092	478,186
September	657,078	437,181
October	601,021	516,814
November	474,731	495,488
December	392,000*	514,337
Total	6,541,323*	5,549,323

Weekly Estimates

Week Ended	1949	Year Ago
Dec. 24	116,567	94,868
Dec. 31	113,026	81,968
	1950	1949
Jan. 7	118,588	98,422
Jan. 14	145,000	112,587

Estimates by Ward's Automotive Reports

* Preliminary.

May Be Smart Publicity—One answer may be the timing. In the early spring, Nash plans to introduce a new smaller car as a companion to its Statesman and Ambassador models. It will be a full-size model, not a diminutive design like the "X" or "International" project, but may have some of the style features of the "X" job now being shown. If public relation reaction to the latter is along the lines of . . well, it's o.k. as far as styling goes, but we want something a little bigger, with more seat room and more acceleration, then Nash can say, bingo, we have it in production now. That may be groping a little hard for an angle, but there was comment along this line at the Detroit showing.

If you would like a questionnaire describing and illustrating the Nash "X" model and giving you an opportunity to express your sentiments for or against, drop a line to Mr. George W. Mason, president, Nash-Kelvinator Corp., 14250 Plymouth Rd., Detroit 27.

K-F Resumes Assemblies

KAISER-FRAZER resumed assemblies last week and will run out about 8000 cars of the current design, parts for which were on hand, before shifting to a shorter-wheelbase and restyled version. Four to five weeks should see the present run off the lines and another shutdown probably will be scheduled before the succeeding design is moving. Still further ahead is a new small car, to be powered by a Willys-Overland "supersonic" engine, a new design on which Willys engineers have been working for the past year or more (STEEL, Dec. 12, p. 69). Of the high compression type, built either in four or six cylinders, the same basic construction will be used by both Willys and K-F, thereby minimizing the extent of the tooling and machining equipment required. K-F will underwrite some tooling and facilities, but the expenditure involved will be considerably less by teaming up with Willys than if an entirely new power plant were to be underwritten. At the same time, Willys will realize savings by the additional production for the K-F account.

Ford Discontinues Coaches

PRODUCTION and sale of Ford Motor coaches will be discontinued Apr. 30 because of the limited market and to permit greater concentration on passenger cars and trucks. Only 200 were sold last year. National distributor for the coaches, Metropolitan Motor Coaches Inc., will be liquidated.

A NEW ENGINEERING MATERIAL:

Ductile castings

SOMETHING NEW IN THE CASTING INDUSTRY

What is DUCTILE IRON? It is an invention relating to a unique alloy that contains the best features of gray cast iron, malleable iron and steel, with much better physical properties.

DUCTILE IRON IS NEW. Patent was applied for in 1947, and granted October 25, 1949. It is so new that engineers may spend years checking its undeveloped possibilities, qualities, properties and applications. In the "as cast" condition it has a combination of properties of an order entirely different from and higher than that obtained in gray cast iron and steel.

Consumers of ferrous alloy castings, and men who specify the engineering materials will be interested in DUCTILE IRON because: it has a tensile strength of 75M to 90M PSI—elongation 2% to 10%—yield point 55M to 65M lbs.—Brinell hardness 175 to 300—modulus of elasticity 25,000,000 lbs.

Illustration suggests the extreme ductility of DUCTILE IRON. This bar, ½" x ¼" as cast, was twisted cold—and it emits a definite, steel-like ring when struck.

DUCTILE IRON has excellent founding properties, can be readily cast into molds of intricate design, and has better castability than steel. It has unique elastic properties not possessed by gray iron and can be cast in heavier sections than malleable.

DUCTILE IRON may be applied to the manufacture of a wide variety of ferrous products and articles usually made of such ferrous alloys as gray cast iron, pearlitic malleable iron, ferritic or standard malleable iron, and cast steel.

We are licensed to furnish the steel industry castings with the above properties. Send us your drawings and inquiries, and we will show how you can profit by using the revolutionary DUCTILE IRON in YOUR products. Licensed under patent from the International Nickel Company.

TYPICAL APPLICATIONS:
DIES • ROLLING MILL HOUSINGS • APRON PLATES • GUIDES • TABLE ROLLERS • TABLE GIRDERS • GEAR BOXES • COUPLING BOXES • SPINDLES • RAILROAD EQUIPMENT • PRESSURE CASTINGS FOR VALVES, PUMPS • FURNACE PARTS • MELTING AND HEAT TREATING POTS • COMPOSITE PRODUCTS • MACHINE TOOL CASTINGS • CYLINDERS • PLUNGERS • SLAG LADLES

YOUNGSTOWN FOUNDRY & MACHINE CO.

YOUNGSTOWN 1, OHIO

Tidewater Ore Pier

Will be built by B & O to handle imported ore. Work will begin shortly

EARLY CONSTRUCTION of a new pier at the Port of Baltimore and designed for handling of imported ore was announced by Baltimore & Ohio Railroad. It will be the first facility of its kind to be built by any railroad on the eastern seaboard.

Orders have been placed for most of the necessary material. Work will begin shortly. The job will cost upwards of $5 million. It will require about 12 months to complete and will be ready to handle a heavy movement of ore as soon as it arrives in the port early in 1951.

Representatives of steel interests say the location is the best in the harbor; it is along Stone House cove, adjacent to B & O's large export coal pier at Curtis bay.

Berthing space and channel depth will be provided to accommodate the largest ore-carrying ships now existing or anticipated. It will have facilities for releasing and turning ships as quickly as possible. A belt conveyor will transport ore to a battery of hoppers over loading tracks.

'Rags to Riches' Story

YOUNGSTOWN Alloy Steel Castings Corp., known as Youngstown's smallest steel plant, started the new year off right by moving into one of Ohio's finest foundry buildings.

The company makes alloy steel castings of all kinds, especially the ticklish jobs for big mills. It also operates a small electric furnace.

Jack Trantin, president, founded the company during the big depression when he saw a need for producing certain alloy castings, including long-lasting guides for bar mills. Since his alloy guides lasted longer than those made of ordinary steel, his business grew fast.

It all began when Mr. Trantin, a metallurgist, built a small steel furnace in his backyard.

Tube Turns Gets Canadian Charter

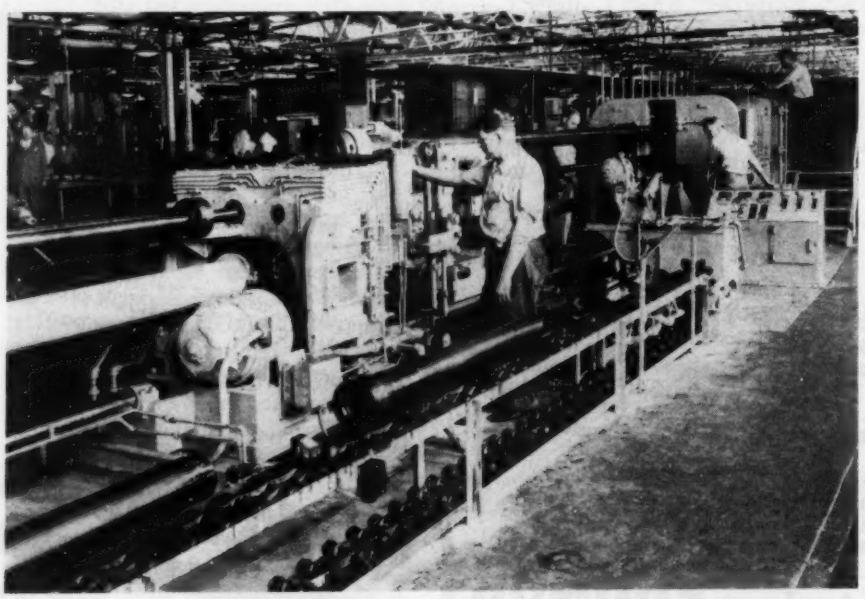
TUBE TURNS of Canada Ltd., granted a Dominion charter last month, is establishing a modern plant in Chatham, Ont. The company, a subsidiary of Tube Turns Inc., Louisville, will manufacture Tube-Turn welding fittings.

Its two-story plant will start operations in about three months. Preparations are being made for installation of special machinery and facilities.

Admiral Buys General Mills Plant

ADMIRAL Corp., maker of radios, TV sets and electrical appliances, bought the 64,000-sq ft General Mills plant in Bloomington, Ill.

Admiral plans to manufacture radios there at first then shift to television receivers.



BREEZE FOR PROPELLER INDUSTRY: Workmen adjust controls on business end of giant machine installed by Hamilton Standard Division of United Aircraft Corp. Tubes of high carbon alloy steel, almost half an inch thick and 6 inches in diameter, are processed while cold on the machine. Walls of tubes that form stress-carrying core of hollow steel propeller blade are reduced to a thirteenth of their former thickness

Forge Department Sold

COMMERCIAL FORGINGS Co., Cleveland, bought the forge department of Johnston & Jennings Co., Cleveland.

The purchase includes a large stock of carbon and alloy steel forging billets, special tools for making arbors, spindles, hollow boring machines for deep drilling and boring holes up to 20 inches in diameter and 20 feet in length.

Walter Illingworth is president and R. J. Wilhelms, general manager, of Commercial Forgings.

Fentron Expansion Continues

ADDITIONS to the manufacturing plant of Fentron Steel Works seem to be as continuous as a modern rolling mill.

William Schiessl, president, says ground has been broken for another addition to the facilities of its Seattle plant. It will add about one-fourth additional manufacturing space.

Erection will be by Fentron's own construction crew. They will build the structure of steel and concrete. It will include facilities for rail and truck shipments. The factory-type building will be used primarily by the Trim-Set Division for manufacture and glazing of Trim-Set packaged window units.

Gilmore Purchases Cooper

GILMORE Steel & Supply Co., large Coast steel distributor, purchased J. T. Cooper Steel Co. for an undisclosed sum. Both companies are in Los Angeles.

Cooper has been established in the city for ten years and specialized in flat-rolled products and aluminum. With its acquisition Gilmore becomes an even larger flat-rolled supplier.

For More Knowledge of Scrap

TO GAIN greater knowledge of the scrap industry is the purpose of a newly formed Chicago organization, the Scrap Iron Technical Association.

Composed entirely of young men who are connected in varying degrees of responsibility with scrap dealer and brokerage companies, the new group will plan and run its monthly meetings as a means of self-improvement and education in the complexities of the business.

Chairman is John Schlossberg, Max Schlossberg Co., Chicago; Sidney Krulewitch, Simon Krulewitch Inc., Chicago, is corresponding secretary; and Arant H. Sherman, Alter Co., Davenport, Iowa, is treasurer.

Briefs . . .

Sale of the old **Weirton Steel Co.** plant at Clarksburg, W. Va., to **West Virginia Tractor & Equipment Co.**, Charleston, for $35,000 was announced by Clarksburg Development Corp., a subsidiary of the Clarksburg Chamber of Commerce. The C of C was given title to the plant when operations were discontinued there about ten years ago. It has been under lease to National Distilling Corp.

—o—

Farm Implement Division of Harvey Mfg. Co. will be sold at auction this week. H. R. Mandel, president, says the firm has discontinued manufacture of farm equipment and will sell 78,000 sq ft of the east section of its building in Milwaukee that had been used by the farm implement division. Mr. Mandel says his company will become a manufacturer of forgings exclusively, retaining its forge shop in the west end of the building.

—o—

Trabon Engineering Corp., Cleveland —automatic grease and oil lubricating systems—licensed a firm in England to produce the same type of equipment that Trabon manufactures. The British company is Exactor Control Co., London.

—o—

General Electric Co., Schenectady, N. Y., transferred manufacture of 15,000 kw turbine generator sets from Schenectady to the GE River Works at Lynn, Mass. Transfer was made to reduce shipment times on such equipment, the company says.

—o—

Peck Spring Co., Plainville, Conn.—springs and screw machine products —announces a new line of industrial spring assortments. The company offers a catalog illustrating and describing the line.

—o—

Sale of **Gardner Machine Co.**, South Beloit, Wis., to **Landis Tool Co.**, Waynesboro, Pa., was approved by stockholders of both companies.

—o—

Reltool Corp., Milwaukee, added a wide range of die sinking cutters for high and low spindle speeds to its line of metal cutting tools. Henry M. Blume, president, says a new 176-page catalog of Reltool's cutting implements is ready for distribution.

—o—

Ironbound Box & Lumber Co., Hillside, N. J., manufacturer of materials handling equipment, has named **F. L. Purdy Co., Columbus, O., as representative in southeastern Ohio and S & T Equipment Co. Inc., Birmingham, as agent for Alabama and northwestern Florida.**

Towmotor Corp., Cleveland manufacturer of fork lift trucks, tractors and accessories, opened a new factory sales and service branch in Oakland, Calif., this week. Gordon Winters, formerly in sales and supervision work in Cleveland, will be in charge.

—o—

Todd Steel Corp., Detroit, extended its facilities for more effective contact with Ohio mill and industrial areas by opening a Cleveland office. Announcement was made by Myron Hokin, president, Century America Corp., of which the Detroit warehouse is an independent operating subsidiary. Clayton Grandy will manage the new branch.

TRENCHING BY TRACTOR: McDonald E-Z Mount Trencher was designed for fast, economical trenching by Mississippi Engineering Co. Inc., Grand Mound, Iowa. A 7½-10-inch wide, 4-5-feet deep trench can be dug at 300 feet per hour

Industrial department of **American Arch Co. Inc.**, New York—flat suspended arches, sectional supported walls, insulation products and Meehanite castings—was purchased by **M. H. Detrick Co.** and is being operated as the M. H. Detrick Co. American Arch Division. Offices are in the Oliver Bldg., Pittsburgh. Former American Arch Co. industrial department executive personnel have been retained to operate the division.

—o—

Pennsylvania Crusher Co., Philadelphia—crushing equipment—appointed these sales representatives: Wharton L. Peters Machinery Co., St. Louis, for Missouri and the southern counties of Illinois and Indiana; Swaney Co., Newtonville, Mass., for Massachusetts, Connecticut, Rhode Island, Vermont, New Hampshire and Maine; and Leatherman & Mertz, Detroit manufacturers' agent, for Detroit, northern and eastern counties of Michigan's lower peninsula.

—o—

Acme Metal Products Co., Baltimore, changed its name to Interstate Products Corp. James L. Smith is president.

—o—

Ampco Metal Inc., Milwaukee, appointed Southern Engine & Pump Co., Houston, as distributor of the Ampco centrifugal pump line. The pumps are made of Ampco Metal (aluminum bronze) throughout for the pumping of process acids, alkalies and other corrosive liquids.

—o—

Hamill Mfg. Co. Inc. is now in its new plant at Washington, Mich., where it has greater capacity and improved facilities for production of tools, dies, jigs, fixtures and stampings.

—o—

Harris Products Co. moved its main offices and plant to new and larger quarters in Cleveland. Harris makes rubber-insulated bearings and bushings.

—o—

Apparatus Agency Division of General Electric Co.'s Industrial Divisions will be replaced by a newly organized Agency & Distributor Division. George L. Irvine was appointed manager of the new division; R. D. Moore will be assistant manager.

—o—

Pacific Coast shipyards of **Bethlehem Steel Co.**, in San Francisco, Alameda and Terminal Island, Calif., were conveyed to **Bethlehem Pacific Coast Steel Corp.** Bethlehem shipbuilding and ship repairs will be conducted by Bethlehem Pacific. T. C. Ingersoll, general manager of the Pacific Coast district shipbuilding division of Bethlehem Steel, will continue in charge of those activities. He becomes general manager of the Shipbuilding Division, Bethlehem Pacific Coast Steel Corp.

—o—

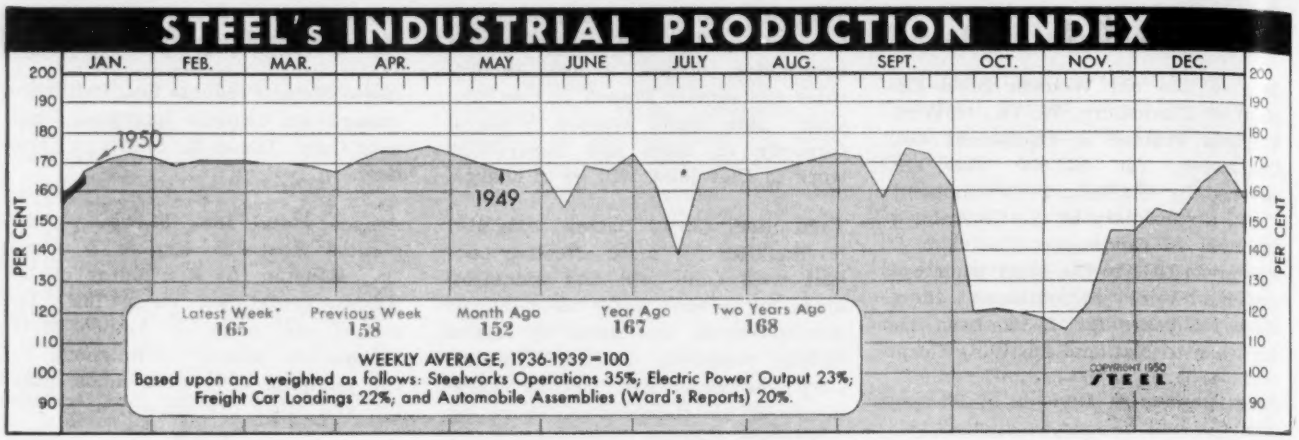
Selas Corp. of America, Philadelphia —heat processing engineers for industry—changed its address for its Chicago office to 3857 W. Washington Blvd.

—o—

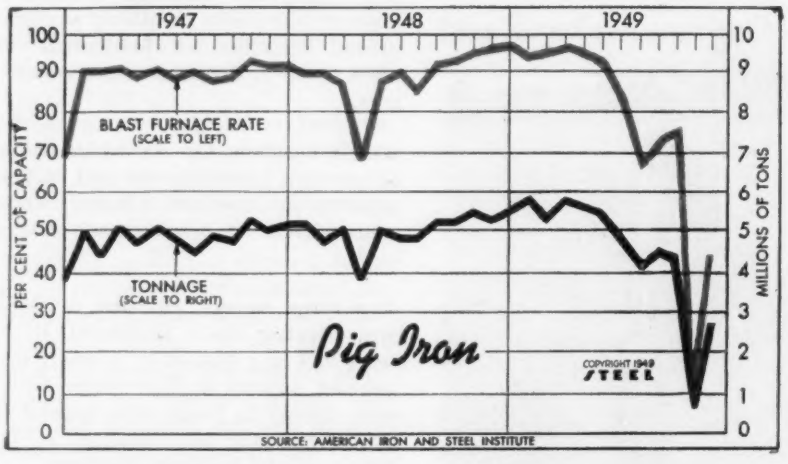
Kennecott Copper Corp. stepped up production of the red metal at its huge Utah operations. The company's Utah copper division restored the 48-hour week in December after operating on a 40-hour week since May.

—o—

The **Nevada-Massachusetts** tungsten mine and mill at Tungsten, Nev., resumed operations this month after being closed since late last June. The firm is the largest tungsten mining operation in the U. S.


STEEL's INDUSTRIAL PRODUCTION INDEX
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
PER CENT
1950
1949
Latest Week* 165
Previous Week 158
Month Ago 152
Year Ago 167
Two Years Ago 168
WEEKLY AVERAGE, 1936-1939=100
Based upon and weighted as follows: Steelworks Operations 35%; Electric Power Output 23%; Freight Car Loadings 22%; and Automobile Assemblies (Ward's Reports) 20%.
COPYRIGHT 1950 STEEL

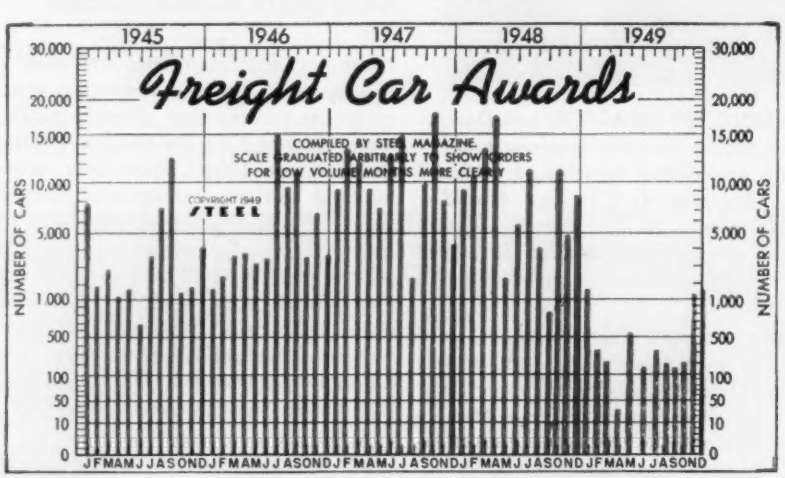
* Week ended Jan. 7 (preliminary).



Pig Iron*

	Production (Net Tons—000)			Operating Rate (% of Capacity)		
	1949	1948	1947	1949	1948	1947
Jan.	5,725	5,194	5,071	95.5	90.9	90.8
Feb.	5,223	4,838	4,550	96.5	90.6	90.3
Mar.	5,820	5,020	5,123	97.1	87.8	91.8
Apr.	5,531	3,840	4,830	95.3	69.4	89.3
May	5,517	5,077	5,081	92.0	88.8	91.0
June	4,819	4,990	4,810	83.0	90.2	89.0
July	4,173	4,900	4,585	69.8	85.9	90.3
Aug.	4,477	5,255	4,916	74.7	92.0	88.1
Sept.	4,350	5,208	4,801	75.1	94.3	89.0
Oct.	612	5,520	5,228	10.2	96.6	93.6
Nov.	2,722	5,399	5,015	46.9	97.6	92.8
Dec.	....	5,595	5,177	...	98.1	92.9
Total	....	60,849	59,210	Ave. ...	90.2	90.1

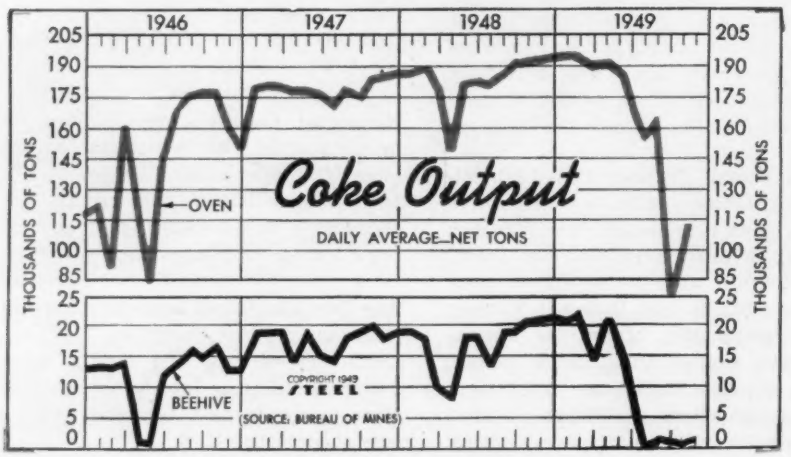
* Includes ferromanganese and spiegeleisen.


1945
1946
1947
1948
1949
Freight Car Awards
COMPILED BY STEEL MAGAZINE.
SCALE GRADUATED ARBITRARILY TO SHOW ORDERS FOR LOW VOLUME MONTHS MORE CLEARLY
COPYRIGHT 1949 STEEL
NUMBER OF CARS
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

Freight Car Awards

	†*1949	*1948	*1947	*1946	1945
Jan. ..	1,663	8,613	9,222	1,481	7,200
Feb. ..	332	10,698	13,724	2,328	1,750
Mar. ..	199	13,227	12,048	4,512	2,500
Apr. ..	30	17,215	9,186	3,564	1,120
May ..	589	2,228	7,389	2,900	1,526
June ..	153	5,368	12,784	3,335	670
July ..	408	11,308	14,840	14,836	3,500
Aug. ..	185	3,638	2,352	9,527	7,240
Sept. .	123	738	9,917	11,102	12,840
Oct. ..	201	10,931	17,737	3,407	1,320
Nov. ..	1,145	4,852	8,079	7,190	1,650
Dec. ..	1,220	8,368	4,030	3,011	4,116
Total .	6,248	97,184	121,308	67,193	45,432

* American Railway Car Institute.
† Preliminary.



Coke Output

Bureau of Mines

(Daily Average Net Tons)

	Oven		Beehive	
	1949	1948	1949	1948
Jan.	196,000	189,191	20,121	19,588
Feb.	195,551	190,098	22,261	18,625
Mar. ...	192,183	182,340	14,030	10,485
Apr.	192,019	149,692	21,098	8,235
May ...	187,040	184,568	17,017	18,651
June ...	174,748	187,200	8,931	18,700
July	158,407	184,286	776	14,032
Aug. ...	165,884	188,468	1,460	19,751
Sept. ...	165,067	192,090	1,001	19,616
Oct.	55,718	192,440	285	20,083
Nov. ...	115,702	193,565	1,008	20,341
Dec. ...	.....	195,670	.....	20,588
Ave. ...	.....	185,634	.....	17,391

The Business Trend

ALTHOUGH industrial production was again largely confined to a four-day week, the daily rate was high in the week ended Jan. 7 and resulted in STEEL's industrial production index rising 7 points to a preliminary 165 per cent of the 1936—1939 average from a revised rate of 158 in the preceding week. With full work-weeks coming up, the rate is destined to make further advances, barring tie-ups that might result from short coal supplies.

STEEL—A 3-point advance in the steelmaking rate in the week ended Jan. 7 to 96.5 per cent of capacity brought operations to the highest level since the first week of May, 1949. Demand continues high enough to sustain operations at or near the present rate in the immediate future. Light flat-rolled products and pipe are in greatest demand and pressure for deliveries is expected to continue throughout the first half of this year.

AUTOMOBILES—Assemblies at a peak daily rate are coming and are a big factor in sustaining steelmaking at near capacity. In the first 1950 week 99,026 passenger cars and 19,562 trucks were assembled in U. S. and Canadian plants. More than 112,000 of the total rolled off U. S. assembly lines for a daily rate of 28,000 vehicles. In September, 1949, the alltime high daily rate of 29,550 was set and this month a new mark may be established as three independents, down since mid-December, are back in production. Truck volume is expected to trend downward during 1950. The extent of the drop depends on lightweight truck sales which last year accounted for about 70 per cent of truck production.

CONSTRUCTION—Heavy construction volume rose to an alltime high of $8157 million in 1949, a 15 per cent increase over the 1948 total. This rapid pace continued into the new year with civil engineering construction volume for the week ended Jan. 5 totaling $323,398,000. Largest item was the $200 million in contracts for expansion of the Atomic Energy Commission's Hanford Works in Richland, Wash. Private construction was $54,479,000.

COAL—Bituminous coal stockpiles continued to shrink and fell to 45,264,000 tons on Dec. 1, says the Bureau of Mines. This was the fifth consecutive monthly decline since the postwar high of about 78 million tons on July 1, 1949. Industrial stocks on the reporting date were: Electric power utilities, 87 days; coke ovens, 60 days; steel and rolling mills, 52 days; cement mills, 45 days; railroads, 24 days; other industrials, 34 days. Coal stocks will continue to dwindle as long as the short work-week continues, periodic regional work stoppages occur, and home heating requirements are high.

FREIGHT CARS—Backlog of unfilled orders for freight cars was down to 12,036 on Jan. 1, compared with 103,896 a year earlier. Only 6248 new cars were ordered in 1949, a decline of more than 90,000 units from 1948. There was a slight revival in ordering at the end of last year and the mild improvement will continue in the early part of this year.

BAROMETERS of BUSINESS

		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	96.5	94.5	93.0	97.5
	Electric Power Distributed (million kilowatt hours)	5,695	5,493	5,881	5,742
	Bituminous Coal Production (daily av.—1000 tons)	1,042	1,507	1,542	1,492
	Petroleum Production (daily av.—1000 bbl)	4,926	4,996	4,979	5,508
	Construction Volume (ENR—Unit $1,000,000)	$323.4	$66.9	$302.1	$124.5
	Automobile and Truck Output (Ward's—number units)	118,588	113,026	52,514	98,422
	*Dates on request. †1949 weekly capacity was 1,843,516 net tons. 1948 weekly capacity was 1,802,476 net tons.				
TRADE	Freight Car Loadings (Unit—1000 cars)	515†	496	669	722
	Business Failures (Dun & Bradstreet, number)	161	109	191	128
	Money in Circulation (in millions of dollars)‡	$27,551	$27,765	$27,699	$28,151
	Department Store Sales (changes from like wk. a yr. ago)‡	−3%	−14%	−8%	none
	†Preliminary. ‡Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$14,295	$11,844	$13,902	$15,045
	Federal Gross Debt (billions)	$256.9	$257.0	$256.9	$252.4
	Bond Volume, NYSE (millions)	$28.7	$20.5	$20.7	$16.1
	Stocks Sales, NYSE (thousands of shares)	9,039	7,977	8,781	5,339
	Loans and Investments (billions)†	$67.4	$67.4	$66.8	$62.8
	United States Gov't. Obligations Held (millions)†	$37,473	$37,657	$37,248	$32,987
	†Member banks, Federal Reserve System.				
PRICES	STEEL's Weighted Finished Steel Price Composite††	156.13	156.88	152.52	155.05
	STEEL's Nonferrous Metal Composite‡	161.5	161.6	162.4	232.6
	All Commodities†	150.7	151.1	151.0	161.7
	Metals and Metal Products†	169.5	169.8	168.9	175.3
	†Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100.				

Men of Industry

F. C. NORRIS

C. A. HUGHES

M. R. MINNICK

F. C. Norris has been promoted from vice president to vice president and general manager, **Denison Engineering Co.,** Columbus, O. **C. A. Hughes,** formerly plant superintendent, has been named vice president and general works manager. During World War II Mr. Norris was general works manager of the four Denison plants, and then became vice president in charge of manufacturing and engineering.

—o—

Aetna Ball & Roller Bearing Co., Chicago, has appointed **J. J. Rozner** as works manager. He has been chief engineer of the company for the last ten years, a post he will continue to hold together with supervision, as works manager, of all manufacturing operations.

—o—

R. B. Hewett, industrial engineer at Park Works of **Crucible Steel Co. of America,** Pittsburgh, has been appointed industrial engineer for all operations of the company.

—o—

Gordon E. Reynolds has been appointed as secretary, **Sealed Power Corp.,** Muskegon, Mich., to fill the unexpired term of **Raymond R. Beardsley,** who resigned as secretary of the company to devote more time to his other interests. Mr. Beardsley remains, however, as vice president and a director. He is a director in several other companies.

—o—

Drake Steel Supply Co., Los Angeles, announces appointment of **Robert L. McJimsey** to division manager of its San Joaquin Valley operations, with headquarters in Fresno, Calif. **William A. Oakford** has been appointed as supervisor of its reinforcing bar fabricating department at Fresno, and **T. V. Morgan** continues there as supervisor of sales.

—o—

Robert F. Frazure has been appointed district manager of the southwest district for **Latrobe Electric Steel Co.,** Latrobe, Pa., with headquarters in St. Louis. Since 1946 he has been Chicago district sales manager, and is succeeded by **Frederick A. Allison,** formerly Detroit sales engineer.

—o—

Management changes in the machinery division of **Dravo Corp.,** Pittsburgh, are: **J. K. Beidler,** former purchasing agent, appointed assistant general manager; **R. M. Rush,** named manager of sales development; **H. M. Graham,** manager, apparatus department; **D. R. Berg,** manager, heating department; and **B. B. Reilly,** manager, air conditioning and combustion department. **G. P. Smith** was appointed purchasing agent to succeed Mr. Beidler.

—o—

John M. Tuthill has been appointed manager, flat-rolled sales, **Youngstown Sheet & Tube Co.,** Youngstown, succeeding **Walter E. Scott,** retired after 43 years with the company. **L. E. Arnold,** salesman in the Detroit district sales office, was transferred to Youngstown to succeed Mr. Tuthill as assistant manager.

—o—

Paul L. McCulloch Jr. has been transferred to the Pittsburgh district sales office, **American Brake Shoe Co.,** where he will serve as sales engineer for the American manganese steel and electro-alloys divisions of the company. He succeeds **M. A. Zeller,** resigned. Mr. McCulloch was formerly located in Rochester, N. Y., with the company.

American Welding & Mfg. Co., Warren, O., announces changes involving expansion of its sales department as follows: **M. R. Minnick,** formerly manager of sales, has been appointed general manager of sales, responsible for all activities and functions of the sales department, and in addition will have personal supervision of the railway equipment division of the company. **H. D. Malone,** assistant manager of sales, has been made manager of sales of a newly created industrial products division, and in this capacity will direct sales activities for all Amweld products except those of the railway equipment and building products divisions. **D. W. Dawson,** former sales promotion manager, has been named manager, product development division, and retains supervision of all sales promotion and advertising activities of the company. **H. E. Gustafson** will retain his post as manager of sales, building products division.

—o—

Phil Arnold, vice president, **Garlock Packing Co.,** Palmyra, N. Y., will retire Jan. 31 as head of the company's sales organization, but will continue in a partially active capacity for an indefinite period as a vice president. He has been associated with the company for more than 41 years. Effective Feb. 1, **Louis Mohn** becomes general sales manager of Garlock, with headquarters at Palmyra. He has been district sales manager at Pittsburgh, and will be succeeded in that position by **Eugene G. Flannery,** sales representative in the Pittsburgh territory.

—o—

W. H. Nichols has been named to head the Cleveland sales district for

Is PHYSICAL STRENGTH your magnet problem?

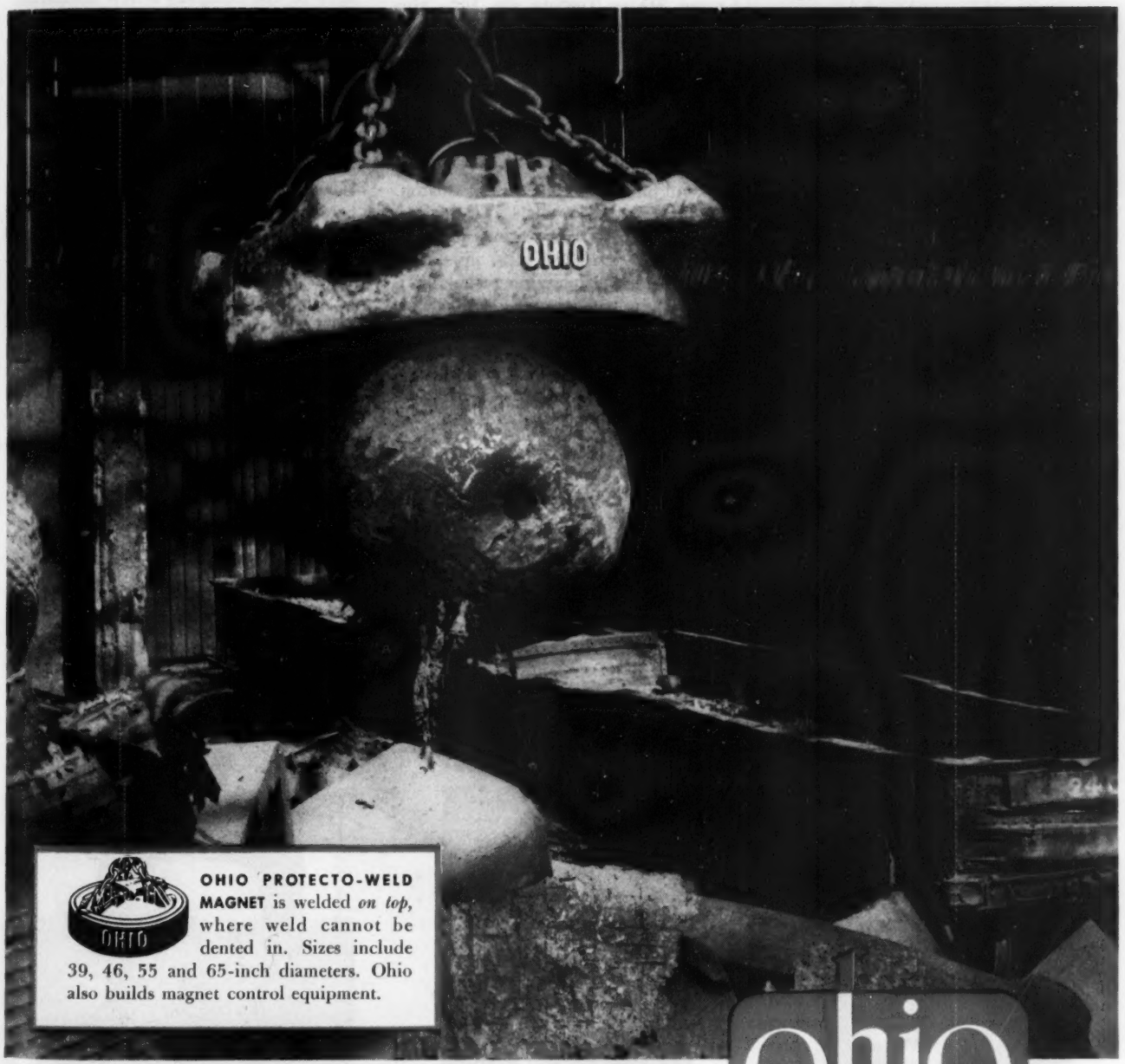
Mills agree that skull-cracking subjects a magnet to the roughest of service. Cautioning crane operators to "take it easy" is sage but frequently impractical advice.

Why not fit your magnet to the job when you buy?

Ohio *basket-type* magnets are specially constructed to withstand hard knocks. "Fenders" project beyond magnet diameter . . . stave off and protect against damaging blows.

For extra magnet life in rough service, install Ohio *basket-type* magnets. Write today to Ohio—25 years a leader in *magnetic materials handling.*

Use "basket" construction for rough service



OHIO PROTECTO-WELD MAGNET is welded *on top,* where weld cannot be dented in. Sizes include 39, 46, 55 and 65-inch diameters. Ohio also builds magnet control equipment.

THE OHIO ELECTRIC MFG. CO. • 5900 MAURICE AVENUE • CLEVELAND 4, OHIO

Ohio MAGNETS

A-2039

Perfection Stove Co. to succeed **W. M. Barber,** appointed to the newly created post of sales promotion and advertising manager. **W. S. Hartman** has been named assistant sales manager of the company's Acorn-Oriole sales division.

—o—

Dr. George Zinzalian has been appointed sales manager, technical products division, **E. F. Drew & Co. Inc.,** New York.

—o—

Kennametal Inc., Latrobe, Pa., announces appointment of **John McVeigh** as special development engineer to augment its technical research staff engaged in extending application of new heat-resistant material Kentanium, particularly to gas turbines. Mr. McVeigh was formerly employed by Continental Motors Corp., Detroit, as project engineer in charge of all gas turbine developments.

—o—

David W. Jones Jr., Denver, will represent **Lukens Steel Co.** and its divisions, By-Products Steel Co. and Lukenweld, in the sale of steel plate and specialty plate products in the Rocky mountain area.

—o—

Kelly Reamer Co., Cleveland, announces appointment of **Robert Kuntz** as sales and engineering representative for Dayton, Springfield, Hamilton, Cincinnati and vicinity, with office at 1217 E. Third St., Dayton, O.; and appointment of Superior Detroit Co., **A. J. Gorsky** and **Ralph Schirmer,** principals, 8253 Grand River Ave., Detroit, as exclusive sales and engineering representatives for Michigan.

—o—

Thomas A. Brown has been appointed assistant manager of operations, Pittsburgh and Graham plants of **Pittsburgh Screw & Bolt Corp.,** Pittsburgh. He formerly was division superintendent of the McDonald Mills of Carnegie-Illinois Steel Corp. at Youngstown. Mr. Brown was appointed chief industrial engineer of the former American Sheet & Tin Plate Co. in 1936. He was made chief of the personnel division of Carnegie-Illinois in 1938 and transferred to Youngstown in 1940.

—o—

R. C. Lewis has been appointed assistant sales manager, **Thomas Steel Co.,** Warren, O. He has been sales representative in the Warren territory. **N. D. Tilbury,** Buffalo representative, succeeds Mr. Lewis, and the Buffalo and Warren districts have been combined.

—o—

United States Testing Co. Inc., Hoboken, N. J., has elected **Gustavus J. Esselen** as vice president. Dr. Esselen will continue in active direction of Esselen Research Division of United States Testing Co., recently created by merger of Esselen Research Corp. with the former company. The division will have headquarters in Boston.

—o—

J. M. Donahue, Mack-International Motor Truck Corp. vice president, has been named manager of the company's Atlantic division, with headquarters in Philadelphia. In this new capacity he will direct all Mack sales and service activities for busses, trucks and fire apparatus in Pennsylvania, Delaware, Maryland and District of Columbia. He has served as manager of the Brooklyn, N. Y., branch and manager of the New Jersey division.

—o—

Charles W. Huse has been appointed director of public relations for **United States Steel Corp.** subsidiaries in the western district. He formerly was public relations director for the single subsidiary, Columbia Steel Co., and will now direct the public relations activities of Columbia Steel and all other U. S. Steel subsidiaries in the West. **Harry J. Williams** was named assistant public relations director for the western district. **Frank A. Burns** was named director of public relations for U. S. Steel subsidiaries in Los Angeles.

—o—

R. E. Barnett has been promoted assistant sales manager of **Marsh Instrument Co.,** sales affiliate of Jas. P. Marsh Corp., Skokie, Ill.

—o—

J. P. Barbour has been appointed manager, small motor division's aircraft department at Lima, O., for **Westinghouse Electric Corp. James B. Council** was appointed branch manager of the company's new manufacturing and repair plant at Ft. Worth, Tex., and **Glenn A. Caldwell,** engineering supervisor of the Detroit engineering and service department.

—o—

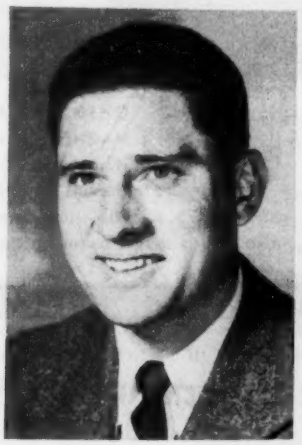
Leonard J. Werne has been appointed general traffic manager of **National Lead Co.,** New York. **H. Fulhorst** has been transferred from Los Angeles traffic department to assistant general traffic manager of the company. **J. F. Doyle** was appointed assistant to the general traffic manager. The following become district traffic managers for National Lead in the cities indicated: **J. E. Barton,** Chicago; **D. B. Norris,** St. Louis; and **A. E. Evers,** San Francisco. **R. Vonnahme** has been transferred from St. Louis to the Los Angeles traffic department as assistant to the general traffic manager.

—o—

Robert L. McFadin has been named manager of the merchandising sales department of **Marley Co. Inc.,** Kansas City, Kans., and has transferred headquarters to the main office in Kansas City. He has been in charge of merchandising sales in the New York office for the past year. He joined Marley Co. in 1948 after as-

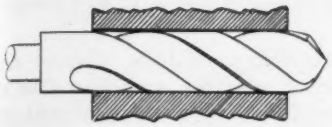
THOMAS A. BROWN

CHARLES W. HUSE

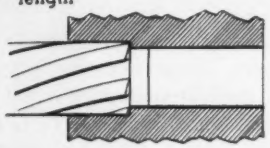


ROBERT L. McFADIN

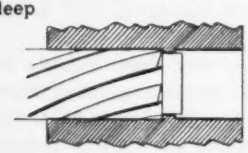
THE OLD WAY



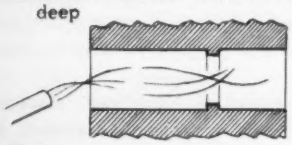
1. Drill 25.5 m.m. (1.004") hole full length



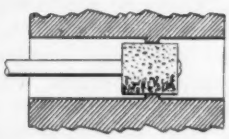
2. Machine bore to 1.761", .9975" deep



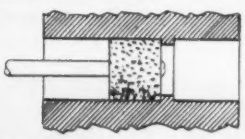
3. Rechuck and machine opposite end of bore to 1.761", 1.9355" deep



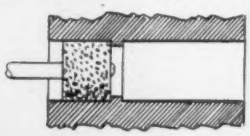
4. Heat treat and quench



5. Grind .00355" off shoulder inside diameter

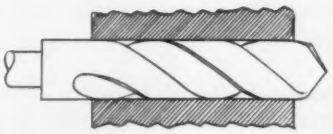


6. Grind .0025" off bore, one end and 0025" off side of shoulder

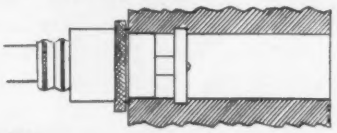


7. Rechuck and grind .0025" off bore, opposite end and .0025" off side of shoulder

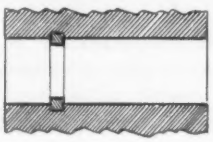
RELIANCE WAY



1. *Drill 1.811" (30 M.M.) hole, full length



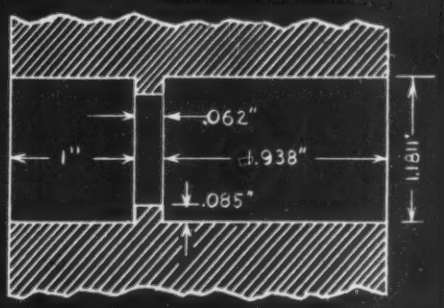
2. Recess groove .074" wide and .040" deep in bore, 1" from end



3. Snap Reliance Ring in groove

* For some applications, seamless tubing may be used, eliminating all drilling

No heat treating is normally required as ring is already hardened. No danger of warpage. If bore must be hardened, it may be ground in one pass after heat treating.



HOW RELIANCE RINGS

(AND GROOVING TOOL)

Slash the Cost

# of internal shoulders

The drawing and comparison chart above show how Reliance Rings and the Reliance Grooving Tool slashed the cost of internal shoulders on a typical application, eliminating four operations — savin gtime and money.

Reliance Snap Rings are available in carbon, alloy, stainless steel or non-ferrous metal to specified physicals, cross sections and diameters—ends shaped to meet any requirement. Reliance Rings offer opportunities for cost reduction, time saving and product improvement limited only by human ingenuity in finding new uses for them.

Reliance engineers will be pleased to study your prints or parts and lend the benefit of their experience in considering possible application of Reliance Rings to your product. Or, if you prefer, a competent representative will call to discuss the possibilities with you. Write, phone or wire your nearest Reliance Sales Office

RELIANCE RINGS

EATON

ATON MANUFACTURING COMPANY

EATON **RELIANCE DIVISION, MASSILLON, OHIO**

Sales Offices: New York, Cleveland, Detroit, Chicago, St. Louis, San Francisco, Montreal

sociation with W. T. Grant Co. as engineer in charge of air conditioning.

—o—

Alexander H. d'Arcambal, vice president and sales manager, small tools and gages, Pratt & Whitney Division,

ALEXANDER H. d'ARCAMBAL

and consulting metallurgist of **Niles-Bement-Pond Co.,** West Hartford, Conn., has been appointed general sales manager of the company, with full responsibility for and authority over all activities of all sales departments. **William P. Kirk,** vice president and sales manager, machine tools, has retired from active participation in the sales program of the company after serving Pratt & Whitney for over 43 years. He will, however, continue to serve as consulting engineer and to represent Pratt & Whitney in certain association work. Reporting directly to Mr. d'Arcambal will be: **J. D. Allan,** manager, Pratt & Whitney domestic machinery sales; **J. C. Molinar,** manager, Pratt & Whitney domestic small tools and gage sales; **H. Reichert,** manager, Pratt & Whitney foreign sales; **R. M. Johnson,** manager, Chandler-Evans Division sales; **J. Potter Cunningham,** vice president and sales manager of Potter & Johnson Co., subsidiary; and **V. L. Howe,** acting manager, advertising.

—o—

Allis-Chalmers Mfg. Co., Milwaukee, announces changes in its general machinery district office personnel: **A. B. Frost,** formerly manager, New Haven, Conn., district office, was named manager of the Boston office which was headed by **W. F. Taylor** as district office manager and manager of the New England region. Mr. Taylor will devote full time to his duties as regional manager. **J. E. Smet,** formerly representative at Boston is now manager, New Haven office. **G. G. Fintak,** an assistant engineer at the West Allis Works, was transferred to the Boston district office to assist sales representatives of the New England region with hydraulic turbine and pump applications.

—o—

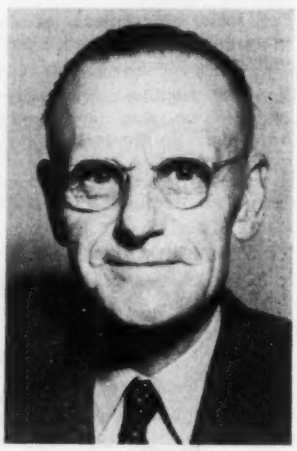
Charles J. Davitt has been appointed director of traffic, **Budd Co.,** Philadelphia. He succeeds **Clarence H. Rolf,** retiring after nearly 33 years as head of the traffic department. Mr. Davitt joined Budd Co. in 1918, and since 1947 has been general traffic manager in the Detroit plant.

—o—

O. V. Badgley, vice president, **General Motors Corp.,** and general manager of its Delco-Remy Division at Anderson, Ind., since 1940, has retired. He is succeeded by **H. D. Dawson,** assistant general manager.

—o—

Walker R. Young consulting engineer, and formerly chief engineer of the U. S. Bureau of Reclamation, has been



WALKER R. YOUNG

chosen president and treasurer of **Thompson Pipe & Steel Co.,** Denver, succeeding **J. Leslie Brown,** who died in November. Other officers named were **Gairald H. Garrett,** vice president, and **Joseph L. Brown,** secretary.

—o—

Barium Steel Corp., New York, has consolidated New England sales offices of subsidiary companies at 454 Park Square Bldg., 31 St. James Ave., Boston, with **John L. Vaupel** as district manager. Mr. Vaupel has been with Phoenix Iron & Steel Co. and Phoenix Bridge Co. since 1931 as district manager, Boston and New York. Represented in the sales office consolidation are Phoenix Iron & Steel Co., Phoenix Bridge Co., Central Iron & Steel Co., and George C. King Co. Associated with Mr. Vaupel at Boston is **William Spooner,** formerly in charge of sales in New England, Central Iron & Steel Co.

Robert F. Bourne has been appointed manager of export sales for the mid-continent territory of **Colorado Fuel & Iron Corp.,** with headquarters in Denver. He succeeds **E. C. Thompson.**

—o—

T. E. Alwyn, Atlantic division manager of sales for **American Can Co.,** New York, has been appointed general manager of sales for the company.

—o—

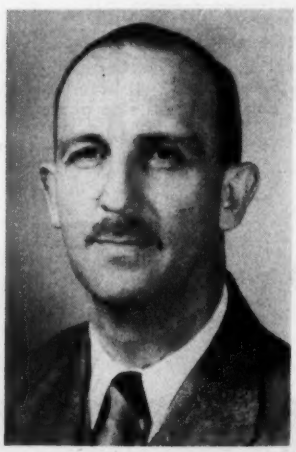
Nichols Wire & Aluminum Co., Davenport, Iowa, announces separation of its warehouse and mill divisions, and appointment of **C. L. Johnston,** manager of sales, warehouse division; and **G. J. Brenneman,** assistant sales manager, mill division.

—o—

United States Steel Supply Co., Los Angeles, announces that **Edward C. La Bart** and **George R. Coffin** have been appointed district managers of the company warehouses in Seattle, and in Portland, Oreg., respectively. Both had been assistant district managers in the respective warehouses.

—o—

L. D. Seymour has been elected a director and secretary-treasurer, and is general manager of the newly formed **Marshall Richards Machine Co. Inc.,** American subsidiary of Marshall Richards Machine Co. Ltd. of England. The new company is a New Jersey corporation, with principal offices in Trenton. It will sell, engineer and service in the United States and Canada wire and tube drawing machinery manufactured by the parent firm. Mr. Seymour joins



L. D. SEYMOUR

Marshall Richards after serving John A. Roebling's Sons Co. as manufacturing manager of its wire division. He had previously been assistant works manager of Steel Co. of Canada at Hamilton, Ont. He was president of the Wire Association for both the 1948 and 1949 terms.

WILLIAM P. HILL

J. E. JACOBS

William P. Hill has been appointed assistant general manager of the Sparrows Point plant, and **J. E. Jacobs** was appointed an assistant general manager of the Lackawanna plant of **Bethlehem Steel Co.**, Bethlehem, Pa. Mr. Hill joined Sparrows Point plant in 1933, and after holding supervisory positions in various departments became superintendent of construction. In 1947 he was made assistant chief engineer, and a year later chief engineer. Mr. Jacobs joined Bethlehem in 1935 as research engineer, transferring to the Lackawanna plant the following year where he served successively as assistant engineer of tests, assistant to the general manager, and management's representative in charge of industrial relations, in which latter position he is succeeded by **B. A. MacDonald,** formerly assistant management's representative.

—o—

Promotion of five executives of **DeVilbiss Co.**, Toledo, O., includes **William A. Delger,** former plant manager, elected vice president in charge of manufacturing; **Don J. Peeps,** chief engineer, advanced to vice president in charge of engineering; **John M. Robinson,** treasurer, elected vice president and treasurer; **Frank R. Pitt,** company legal counsel, named secretary; and **R. Miles Booth,** member of the treasurer's staff, appointed assistant secretary and assistant treasurer.

—o—

Raphael G. Jeter, general counsel, **B. F. Goodrich Co., Akron,** has been elected secretary and general counsel of the company, succeeding **Willis F. Avery,** retired after more than 25 years of service.

—o—

R. L. Shannon, formerly a district manager in the metal industries department, **Diversey Corp.**, Chicago, has been named promotional manager, succeeding **B. B. Button,** promoted to special assistant to **W. E. Noyes,** general sales manager.

—o—

Laurence Ripich has been elected to the board of directors and secretary of **American Tank & Fabricating Co.**, Cleveland, and **K. J. Humberstone,** chief metallurgist, was also elected to the board.

—o—

General Box Co. announces consolidation of its Chicago and Louisville sales territories, with headquarters of the enlarged territory located at Louisville. **George T. Walne,** vice president, will be transferred from Chicago to Louisville in charge of sales for the combined territories. **C. L. Bruckert,** who has administered sales in the Louisville territory, will be promoted to division sales promotion manager. **W. C. Embry** of Louisville, vice president and member of the board, remains as division manager.

—o—

Robert E. Reedy has been appointed manager, sales engineering department, **Lockheed Aircraft Corp.**, Burbank, Calif., and will be assisted by **Byron B. Masterson,** in charge of commercial sales engineering.

—o—

Harry J. Anderson has been promoted to manager, exhibit section, advertising division, **United States Steel Corp.** of Delaware, replacing **M. L. Nelson,** resigned. **Fred E. Link,** general works manager for Oil Well Supply Co., Dallas, U. S. Steel subsidiary, has been named to a special post of assistant to president.

—o—

Frank L. Condit has been appointed district representative to the Chicago branch of **Berger Mfg. Division,** Republic Steel Corp. He will handle the sale of lockers, shelving and steel office equipment in the northern Illinois territory.

—o—

J. J. Davis Jr., manager of sales, railroad division, **Inland Steel Co.**, Chicago, has assumed the added responsibility for pig iron and chemical sales. **A. C. Engh** has been appointed manager of pig iron and chemical section of the consolidated sales units.

—o—

Louis Geerts has been appointed assistant district sales manager, eastern sales district, **Republic Steel Corp.**, Cleveland. He will have charge of the Boston territory, succeeding **J. P. Barnum,** retired.

OBITUARIES...

Herman O. Brumder, 69, president, **Pressed Steel Tank Co.**, Milwaukee, died Jan. 4. He had been a director of the container concern since 1906, becoming president in 1923.

—o—

Stephen C. Cheney, 67, president, **S. Cheney & Son,** foundry, Syracuse, N. Y., died Jan. 5.

—o—

Emerson H. Fairchild, 59, who had been in the materials handling industry for more than a quarter of a century, died Jan. 1 at his home in Cleveland. He had been in ill health for some time, and retired from business late in 1949. At time of retirement his firm, **E. H. Fairchild Co.** of New Orleans, was sales representative for Automatic Transportation Co., Chicago, in southern territory.

—o—

Edward J. Henesey, 65, founder of the former **Henesey-Mann Structural Steel Co.**, Buffalo, died Jan. 8. The firm was dissolved in 1930.

—o—

Edward E. Reeser, 59, treasurer and office manager, **Lehigh Structural Steel Co.**, and associated with the firm since its organization in 1919, died in Allentown, Pa., Jan. 7.

—o—

Charles G. Roberts Jr., 45, product manager for radio and television broadcast equipment at **General Electric Co.'s** plant at Syracuse, N. Y., died Jan. 7.

—o—

Albert H. Paustian, 83, chairman of the board of **Brillion Iron Works,** Brillion, Wis., died Jan. 1. He joined the firm as president in 1933.

AMERICAN WELDING

is for

Rings, bands and weldments, fabricated by American Welding "Controlled Technique" will *save you money!*

All types of resistance and fusion welding applicable to ferrous and non-ferrous metals and alloys. Heat-treating and machining facilities are available.

It's easier and more economical for *you* to *specify* American Welding. Over 32 years' experience is yours for the asking. Send your requirements for prompt quotation.

SEND FOR 16 PAGE CATALOG!

THE AMERICAN WELDING & MANUFACTURING CO.

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Production AND Engineering
NEWS AT A GLANCE

JOINS GALVANIZED PLATE— Because of its penetrating arc, an electrode developed by General Electric Co., Schenectady, N. Y., is capable of welding galvanized plate stock. Designed specifically for vertical and overhead welding of all types of joints in mild steel, it provides high tensile strength and ductility with good impact resistance. Very smooth contour deposits are made without necessity of oscillation. Electrode also may be employed for repair welding castings.

ORGANIZED COST CUTTING— Quest for cost reductions now is more highly organized in most firms than ever before. It covers every activity that involves large expenditures, according to *Automobile Facts.* In one auto concern alone, it is pointed out, 96 technical committees are working today to make company dollars stretch further. Any promising idea is tested in one of the company's plants. If it gets results, a technical group spreads it to other plants. In one plant, for instance, a program for reducing leaks in compressed air pipes was tested. It involved repacking of air valves and taking out unnecessary pipes. When the program showed savings, it was put in force at all plants. As a result, the company saved $100,000 last year.

STOPS RUST FORMATION—You now can stop worrying about rust forming on shipped metal parts. Nox-Rust Chemical Corp., Chicago, reports perfection of a method for impregnating chipboard and corrugated cartons with a chemical which eliminates need for temporary rust preventive coatings on metal products and inner wrappings to keep the carton from oil or grease staining. Rust formation is prevented by an invisible vapor released within the closed container.

QUALITY PLUS—Lengths to which Swiss machinists go in getting accuracy in their machines is exemplified by jig boring machine housed in a special glass-enclosed section of a Detroit automotive plant's main toolroom. Parts of the machine, considered one of the world's most accurate, were made in controlled-temperature rooms, three stories underground. The delicate work was done on automatic machines which were set to begin operating 18 hours after workers left the room—so parts could recover from any expansion due to heat from workers' bodies. The men did not re-enter the room again until eight hours after the cutting operations were completed. A seismograph beside the cutting machine recorded any earth tremors that may have effected accuracy of the work.

TWO MILLION POUND SQUEEZE— Simulated service tests on full-scale passenger railway cars (required by American Association of Railroads) are performed on a single horizontal hydraulic compression machine that exerts a two million pound force at E. G. Budd Co., Philadelphia. The Budd-designed unit makes all required tests from determining side-swiping strength to checking strength of vital subassemblies such as the vestibule floor assembly. An elevator lifts cars to any position between the power and reaction heads of the ram so loads may be centered on any desired point. Detailed strength and elastic behavior data are obtained through some 480 autographically recording strain gages.

"NOW AND THEN" OILING—Many factors can affect electric motor operation. Perhaps most aggravating of these is lubrication—because it seems so simple. Only two bearings are involved, and they are so well housed that a shot of grease now and then would seem to take care of requirements. This "now and then" factor actually is what causes so many motor troubles. So often, it is not the fault of the lubricant, but the way it is applied. (p. 56)

STEPPED UP HEATING—New gas-fired billet heating furnace, currently producing about 2200 pounds of work per hour, in General Motors Corp.'s Chevrolet Forge Division, Detroit, is a departure from the conventional forging furnace. It handles 138 blanks at one time. These are on 3-inch centers and remain in the furnace for about 20 minutes heating time on a 7-minute step. Twelve burners are employed to heat the bars to 2250° F during their travel through the unit. (p. 61)

INDUSTRIAL "EVOLUTION" — Nails and fence have become so intimately associated with the wire industry that today jointly they constitute nearly half the average mill's output. In the early days nail makers were wire buyers, but the wire mills soon absorbed the business. This development was stimulated by discovery that scratched and off-size wire and shorts, in fact practically any form of mill casualty, could be buried in the nail keg. Wire fence, in contrast, did not come into the average wire mill by absorption. In most cases, the fence mill developed to a point where it needed and built a wire mill of its own—in fact often going on to acquire rod mills and even steel plants. (p. 70)

NEW MACHINABILITY TEST— Latest method of measuring the complex and elusive property of machinability is reported to make practical the selection of a bar stock and determining from it the probable machinability for the entire lot. Based on the use of a specially-rigged up Monarch lathe, the testing technique was first revealed last summer following its development in course of a co-operative research project conducted at Battelle Memorial Institute under sponsorship of Carnegie-Illinois Steel Corp. (p. 80)

How To Lubricate for

LONGER ELECTRIC

To lubricate an electric motor effectively, it is necessary to understand the bearings, how they are installed and what provision is made for their lubrication. Regular schedules for relubrication and cleaning can go a long way in promoting motor life in line with manufacturers' standards

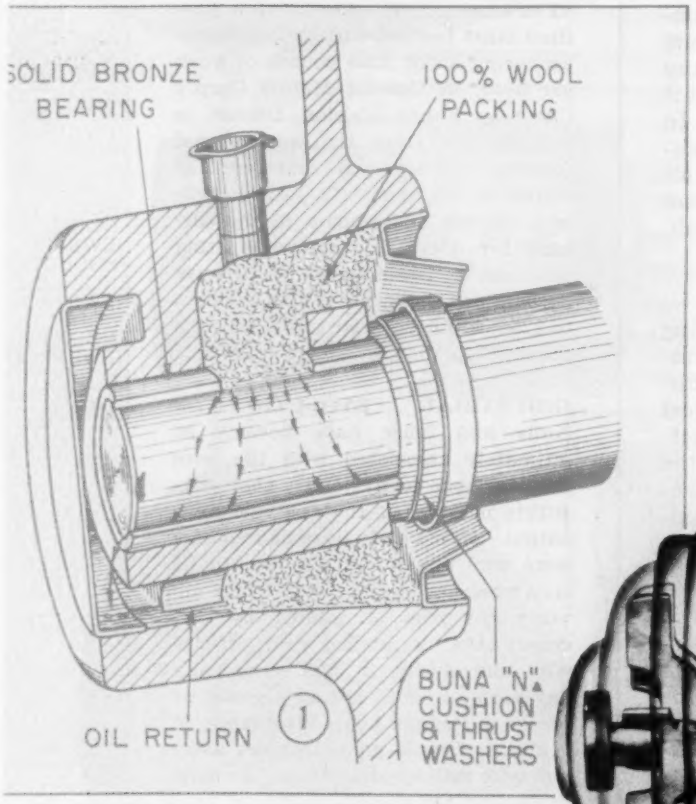


Fig. 1—Details of a Leland sleeve-type motor bearing. 100 per cent wool wick pressed in the bearing cavity causes oil to rise from the cavity upward by capillary attraction to the window or outlet at top of bearing to bring about continuous circulation of oil. Courtesy Leland Electric Co.

A NUMBER of factors can affect electric motor operation. They include overloading, extremes of temperatures, vibration, dust and dirt, and lubrication. Often, the most aggravating is lubrication because it seems so simple. Only two bearings are involved. Offhand, they seem to be well housed, so a shot of grease from a pressure gun or some oil (if the bearing is built for oil) is all that seems necessary now and then.

"Now and then" is what causes so many motor bearing troubles. Furthermore, so often, it is not the lubricant but the way it is applied. Too little can lead to bearing wear through starved lubrication. Too much can cause seal failure or oily windings. A regular schedule for relubrication (after studying the operating conditions along with the bearing

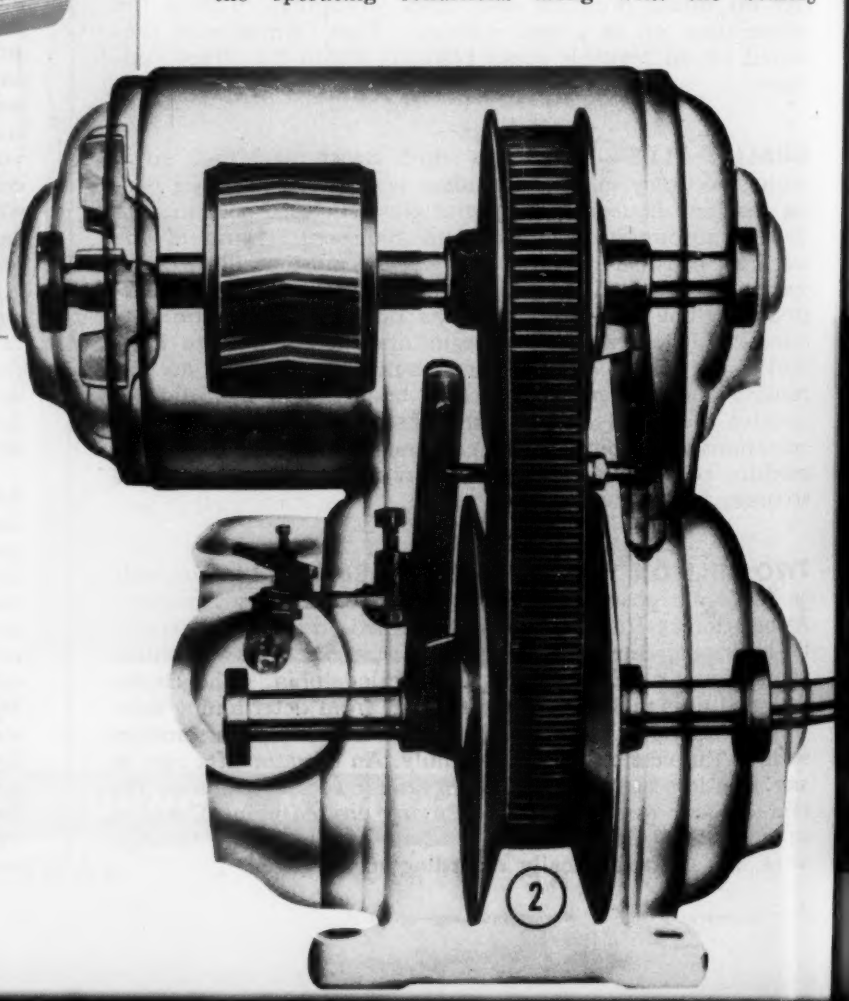


Fig. 2—Sterling Speed-Trol electric power drive. Positive lubrication is a feature by virtue of the specially designed seals which prevent entry of nonlubricating materials into bearing housings. Courtesy Sterling Electric Motors Inc.

By A. F. BREWER
Technical and Research Division
The Texas Co.
New York

MOTOR LIFE

design), and a regular schedule for cleaning can go a long way in promoting motor life in line with manufacturers' standards.

Motor builders have done a remarkable job in perfecting the design of a machine which operates probably under more severe conditions, more frequently, than any other piece of machinery. It was not too long ago that use of electric motor power in some types of service was approached cautiously, i.e., where arcing might cause explosions, or where the motor might have to run deluged with water. The explosion-proof motor changed all this. Today engineers take a practical view of maintenance as related to their motor power. They regard motor lubrication in a similar manner, fully realizing that dependable lubrication has a definite relation to motor life.

Petroleum Industry Co-operates—The petroleum industry is particularly interested in trends in motor design and the desire of some motor builders to relieve operators of all thought of lubrication especially when dealing with ball-bearings. Methods of refinement and compounding are continually developing more dependable greases, products strongly resistant to oxidation, separation and solubility, and free from corrosive alkalis or acids.

It is not justified, however, to place the entire burden on the lubricant. The combination of design, bearings and lubricant can only function under a so-called "life-time" period when the motor is installed under favorable operating conditions. Extremes of temperature, for example, could reduce the dependability of initial "life-time" lubrication and render renewal of lubricant a necessity.

Plain or Sleeve-Type Bearings—In the plain or sleeve-type motor bearing, study of lubricant characteristics, composition of bearing metals and methods of lubrication is essential to effective bearing protection. This is assured by positive lubrication through continuous presence of the necessary amount of lubricant to furnish an adequate film, and suitable bearing construction to permit complete circulation of the lubricant throughout the clearance space which exists between the stationary and moving parts.

Theory of lubrication is based upon a definite relation between load, operating speed, bearing clearance, viscosity of the lubricant and point of oil application. When lubrication is effective and an adequate film is constantly maintained the bearing serves chiefly as a guide to insure alignment; in the event of failure of the lubricating film, however, the bearing must function as a safeguard to prevent actual damage to shafting or other parts of the machine.

For this reason, sleeve-type bearing metal must be softer than any of the steels used for shafting or journal construction, and capable of wiping or even melting when in actual rubbing contact with the latter, to insure against scoring or cutting. It must be of sufficient hardness to carry the prevailing loads even at abnormally high temperatures, without wiping or becoming distorted, and yet the metal must be sufficiently plastic or ductile to conform to any irregularities on the surface of the shaft.

Two-part or split bearings are used in some types of heavy duty industrial motors. With this type of bearing the armature can be removed readily without disturbing the bearing assembly or the bearing can be removed without displacing the armature. Lower horsepower or fractional motors which employ sleeve-type bearings, however, are equipped with solid bronze or babbitt-lined shells.

Motor Horizontal—Sleeve-type bearings designed for ring, wick or wool yarn oiling are most dependable when the motor is set horizontally on a level base. In wick oiling systems, the wick touches the journal through a hole in the bottom of the bearing. Here flow of oil is upward by capillary action. Wool yarn systems lubricate by the same principle, but here a greater amount of material is used, oftentimes the yarn being in contact with the shaft over a considerable area and completely filling the bearing cavity.

Sleeve-bearings should be designed so as to provide adequate circulation of the oil, which is usually a straight mineral, highly refined product, of viscosity or body suited to the operating conditions.

Normally oils ranging from 150 to 500 seconds Saybolt Universal at 100° F will function effectually although products of considerably lower viscosity may be used for some types of specialty motors.

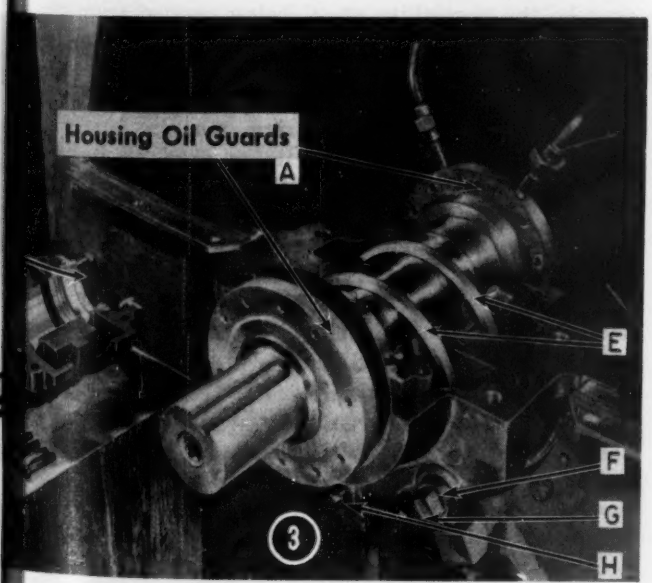


Fig. 3—View of upper half of an A-C capsule type sleeve bearing. A—housing oil guards, B and C—bushing oil guards, D—oil spray chamber, E—oil ring, F—overflow tap, G—oil feed tap and H—oil drain. Pressure equalizing vent pipes on inner housing oil guard are a feature on A-C high speed motors. Courtesy Allis-Chalmers Mfg. Co.

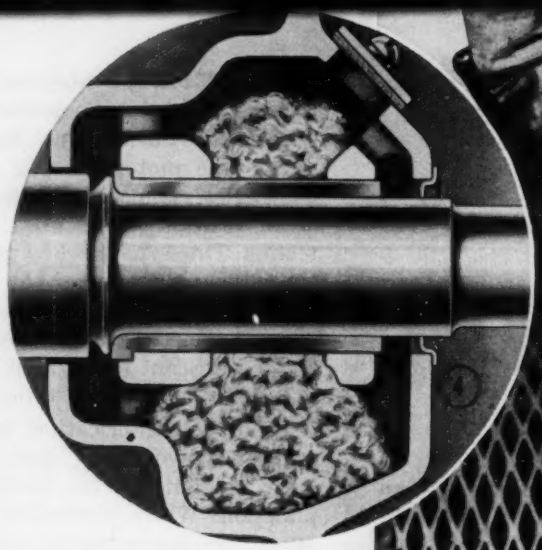


Fig. 4—Cutaway of a F-M motor sleeve bearing. Note use of oil soaked wool waste packing which surrounds the Oilite sleeve but does not come into contact with the shaft. Courtesy Fairbanks-Morse & Co.

Fig. 5—One-to-one type motor bearing designed by Electric Products with ratio of length to shaft diameter 1:1. Another feature of this design is the elimination of oil grooves. Courtesy Electric Products Co.

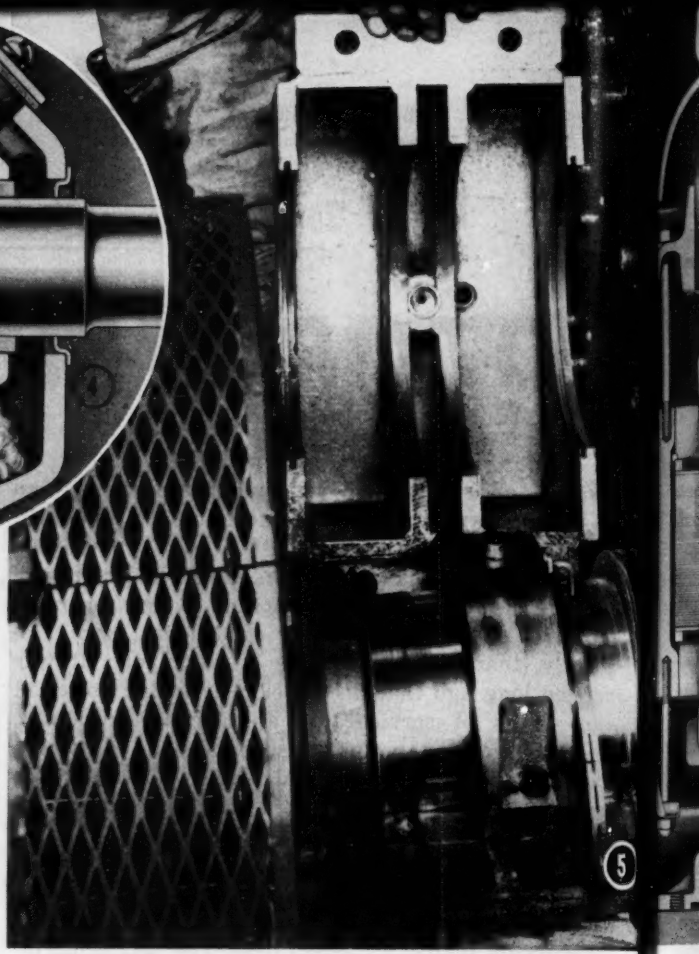


Fig. 6—Details of U. S. Verticlosed motor. Courtesy U. S. Electrical Motors Inc.

Fig. 7—G-E Tri-Clad completely enclosed motor bearing housing showing relation of parts. Courtesy General Electric Co.

Fig. 8—Cutaway view of a Reliance totally-enclosed fan-cooled induction motor. Courtesy Reliance Electric & Engineering Co.

Fig. 9—Cutaway view of a Brown-Brockmeyer brush riding repulsion induction motor equipped with prelubricated sealed type ball bearings. Courtesy Brown-Brockmeyer Co.

Stated in absolute units directly related to bearing design, these viscosities are in the range of 30 to 110 centipoises.

Oil Grooving—Electric motor builders are careful in the location of oil grooves, and cutting away of the bearing metal. The theory, of course, is to direct the oil to the high pressure area, and promote the necessary pumping action when the rotor shaft is turning. The oil ring or chain, or the wick element delivers oil to the top of the shaft. This starts the circulation of a film through the bearing clearance; wedge action, plus pumping via the oil grooves completes the cycle.

Oil grooves cut in the low pressure surfaces of a bearing help to maintain a protective film at the high pressure area, provided the means of initial delivery of oil are adapted to the constructional and operating conditions and the grooves are connected or located with respect to each other and the point of maximum bearing pressure.

How oil grooves function in service will be of interest. Normally, they provide an initial receptacle for receiving the oil as it passes into the bearing from the lubricator, thus serving as a means for distributing lubrication lengthwise along the bearing so that as the moving surface of the rotating or sliding element passes the grooves or chamfers, it will take up an adequate protective film of lubricant. In theory, this is thick film lubrication.

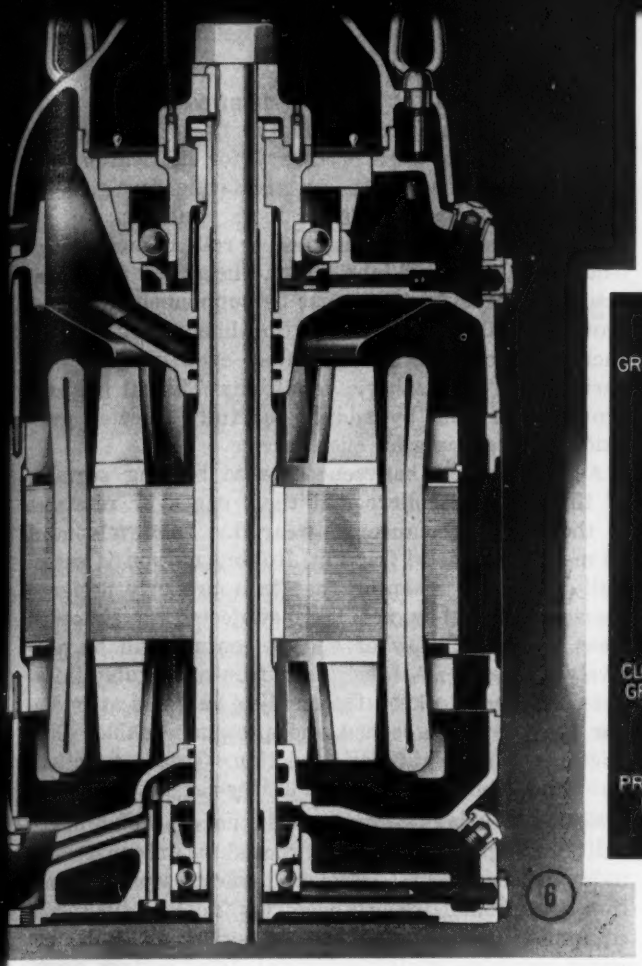
Alternate Circulation—By suitably designing a system of grooving, provision can be made for circulation of oil alternately from the center of the bearing to the outer ends and back again. How intricate such a layout would have to be would depend primarily upon the means of initial lubrication. Where sight feed or drip lubrication is involved, or in other words periodic lubrication with just about the right amount of oil to maintain an adequate lubricating film, grooving will play a more important part than where flood lubrication is employed. Well designed grooving also prevents excessive oil leakage at the ends of the bearings.

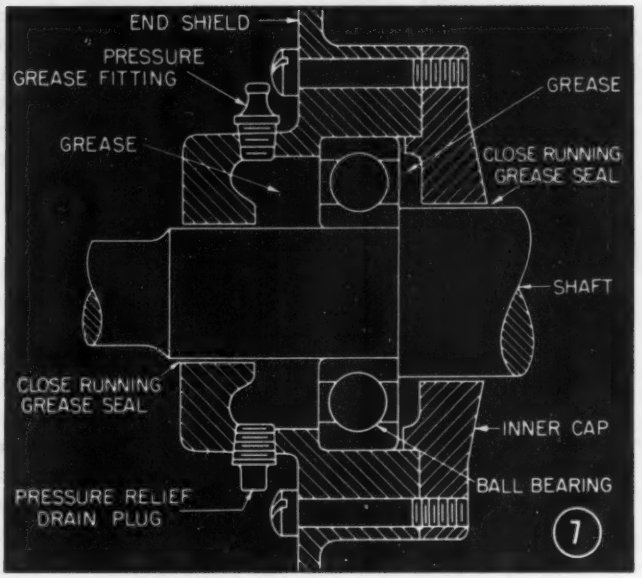
Grooving should be confined to those parts of the bearing which carry the least load. Oil must flow from a low presure area to a zone of higher pressure. Should this latter be grooved to any extent there may be the possibility of oil being carried from the bearing, the lubricating film impaired, waste increased, and the development of abnormal wear. In a two-part motor bearing only the top bearing normally is grooved. No sleeve bearing should be cut away or have the continuity of its surface altered by grooves within 15 degrees either way of the point of maximum pressure, otherwise uniformity in the oil film may be impaired. Furthermore, the lubricant should wherever possible be led into the bearing at the point where pressure is lowest so that the wedge action set up by chamfering will aid in film formation.

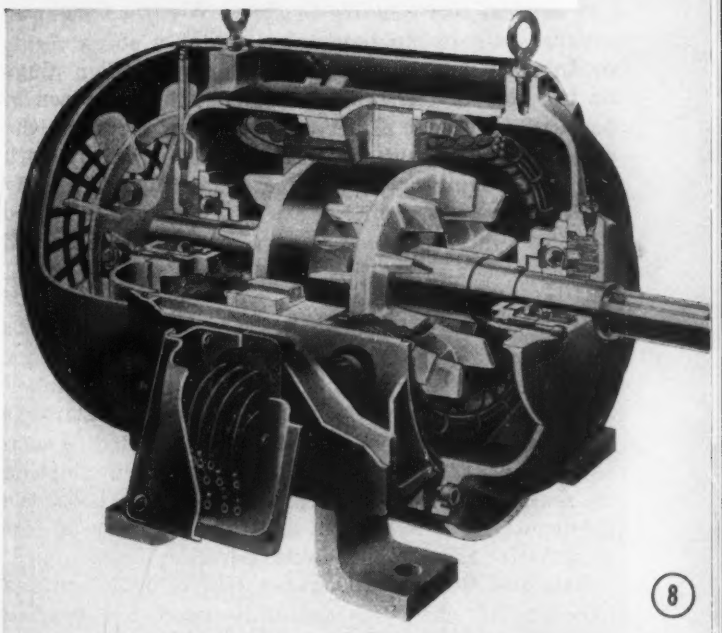
The ring-oiled sleeve bearing utilizes its oil grooves and the passages at each end of the bearing to return the oil to the reservoir in the base; at the same time this return oil will flush out any nonlubricating material before windage can draw it through the bearing.

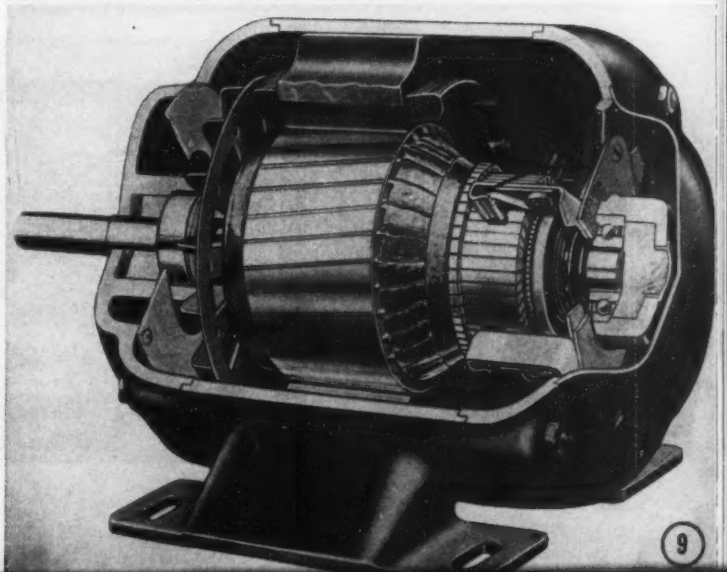
Lubrication Procedure—Limited quantity of oil in a sleeve-type motor bearing and the rapid rate of

LONGER ELECTRIC MOTOR LIFE









circulation requires careful consideration of both quality and the probable operating viscosity. As this latter is influenced by temperature, the operating range should be ascertained and the viscosity of the lubricating oil decided upon accordingly. Not much cooling occurs other than by radiation of heat from the exterior of the bearing or its oil reservoir. Yet, even this comparatively small area normally keeps bearing temperatures well below the danger point, and usually comfortable to touch. The oil reservoir in the modern ring-oiled motor bearing also will be of adequate capacity to give the oil some time to rest and settle out any sediment or foreign matter that may have been picked up through windage or penetration. This occurs more rapidly with lighter oils.

Settling and radiation becomes more effective when the level is not carried too high. For this reason renewal of lubrication is important. Provided an oil filler and gage is installed (to control the oil level) it will be cleaner and more economical to add oil at this point while the motor is idle, to about $\frac{1}{8}$-inch from the top, instead of filling through the inspection port at the top. The latter procedure often leads to waste through overflow.

Oil Creepage—Too much oil can cause oil creepage into the motor. This may be accelerated by windage along with the development of oil spray where the oil level is carried too high, or if the oil overflow is not large enough.

To prevent this and also to protect the armature coils and pole windings, motor builders install oil baffles, throwers or labyrinth packing on the motor

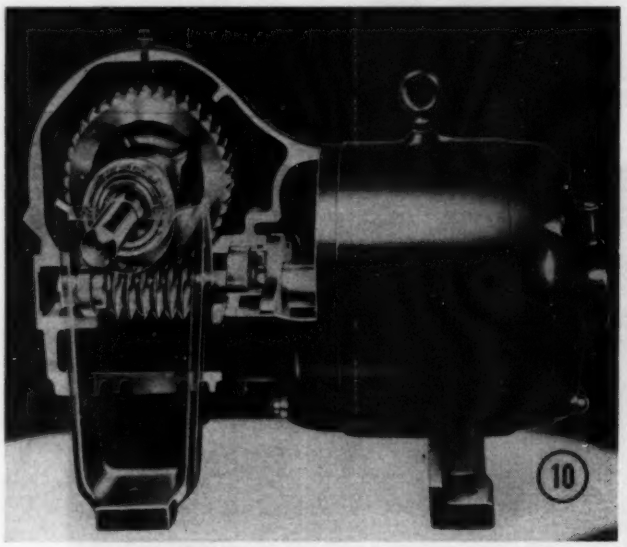


Fig. 10—*In this Master right angle gearhead motor all gears and bearings are lubricated by oil in the gear-case. Splash provides adequate lubrication for the bearings. Courtesy Master Electric Co.*

Fig. 11—*Exploded view of Westinghouse Life-Line motor showing bearing hub and ball bearing assembly. Courtesy Westinghouse Electric Corp.*

or inboard side of the bearing and oil filler plugs on the side of the bearing housing. Such devices in particular prevent direct circulation of air from the outside and through the bearings. In company with proper grooving of the bearing metal to permit ready distribution and return of the oil, they are regarded as adequate assurance that effective lubrication will be maintained.

A sealed vapor and spray chamber at each end of the bearing also will function to retain oil vapor and spray which may be thrown off by the oil rings.

Any lubricant present elsewhere than in the lubricating system may very easily develop a hazardous or sloppy condition which should be corrected as soon as possible. Attention to bearing design and adoption of sealing devices which will positively keep the lubricant where it belongs and prevent entry of foreign matter assure dependable operation.

Ball and Roller Bearings — Use of ball bearings imposed an added responsibility upon the bearing manufacturers, as it required improvement of bearing seals, not only to extend the life of the quality lubricants which were necessary for lubrication, but also to prevent entry of contaminating foreign matter. Effective sealing also reduces windage.

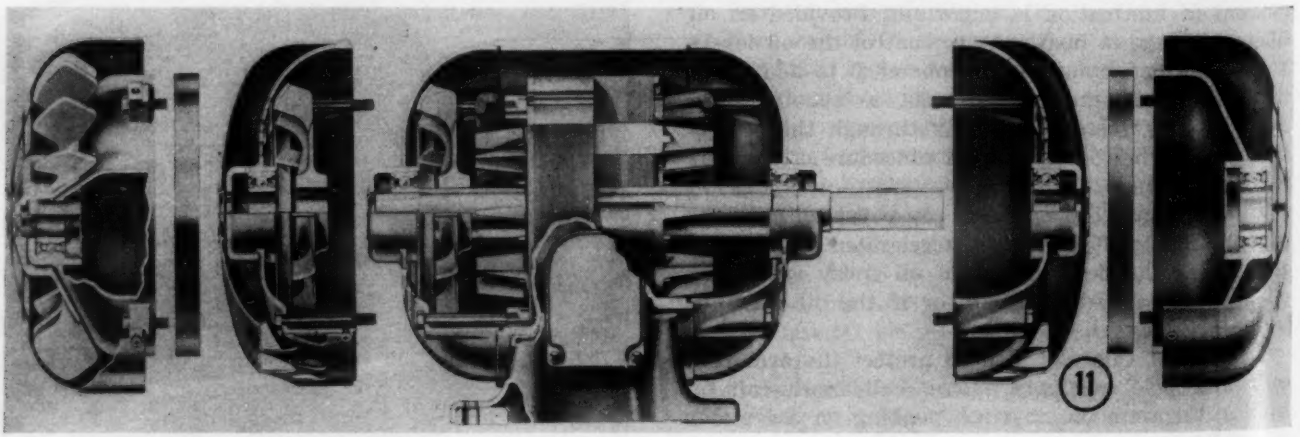
Duty of the lubricant in a ball or roller bearing is extended beyond actual lubrication. The ability to prevent actual metallic friction must be supplemented by the protective ability, whereby the lubricating film is such that corrosion is prevented, even under a wide variation in atmospheric conditions. The oil industry provides for this by adding carefully selected antioxidants to greases for such service.

Actual contact between metallic bearing surfaces of the balls or rollers and their cages or retainers is the principal cause of wear due to development of metallic or solid friction. Rolling motion is essentially involved, meaning that in a properly designed bearing which has not been subjected to abnormal wear, the possibility of sliding contact will be relatively negligible. A lubricating film of suitable thickness and body to keep the metallic surfaces apart under the prevailing speed and pressure enables fluid friction to supplant solid friction. Grease functions like thick-film oil lubrication in this regard.

Sealed Bearings—The sealed-type of prelubricated ball bearing is being widely used in motor service today where speed control and low power consumption are of chief importance. This includes household equipment, such as vacuum cleaners, also small high speed machine tools, industrial type motors up to around 200 hp. Relation of type of lubricant to speed is often overlooked. Where speed must be accurately controlled in precision equipment, low starting and running torques are most essential.

Service influences type of seal used. Purpose of the seal is to prevent leakage of lubricant or entry of contaminating foreign matter. A variety of seals have been developed including felt and cork washers or gaskets, metallic slingers, dust collars, expanding leather devices, grease-filled grooves, or various combinations of these.

Type of Grease — Grease for motor ball bearing lubrication should be as free from acid-forming tendencies as possible in order to insure adequate protection of the highly polished metallic surfaces. In effect, this involves manufacture of an essentially netural product and of course, the absence of fillers. Presence of any material (*Please turn to Page* 90)



FORGING FLEXIBILITY

Enhanced by Gas-Fired Furnace

By JAMES R. ROSS
Senior Engineer
Chevrolet Forge Division
General Motors Corp.
Detroit

MASS production operations require close attention to the many details of processing.

Any short-cut, or new idea that will increase efficiency, reduce the number of operations, or lower the unit cost, without impairing quality of the product, is eagerly sought. This line of thinking is evident in many organizations where new machines have been installed and new processes adopted to keep pace with modern techniques.

A new gas-fired billet heating furnace at the Chevrolet Forge Division of General Motors Corp., Detroit, is a departure from the conventional forging furnace which, after several months of successful operation, seems to fulfill part of the answers at least, for a flexible, easily maintained, mechanical unit. There was a need for a furnace to meet these requirements and a general design was made for a furnace which would respond:

1. To interruptive demands for heated steel; 2. permit ease of unloading between shifts, over weekends, or during prolonged shutdowns for press repairs, die changes, etc.; 3. minimize maintenance by reason of standard refractories, gas burner equipment, and hydraulic equipment; 4. to allow operators to anticipate relief and lunch periods, die touch-ups, etc., and thus by an unloaded space on the beam, coincide the output to actual operating conditions; 5. to give a satisfactory heat, uniform, and with a minimum of scale.

More Production Achieved — That this last item has been achieved is borne out by the fact that the first set of dies from the job had 15 per cent more production than previous averages. The economies of operation of this furnace are many-fold, one being fuel economy. On a three shift per day, 5 days per week operating schedule, the gas consumption showed about 3000 cu ft of 1000 Btu natural gas per ton of steel heated. This is low for this type of operation.

Figs. 1 and 2 show the furnace proper. It is of the walking beam type, well known for some phases of bar stock or tray type heat treating, but not so well known for forging purposes. The beam is of a high grade refractory mounted on an alloy channel and hydraulically raised and stroked. The beam travel backward and forward is 1¼-inches, and the upward and downward travel is 2 inches. The side

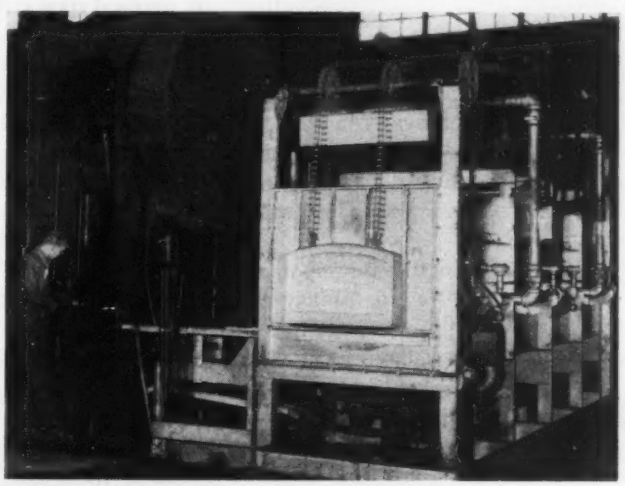
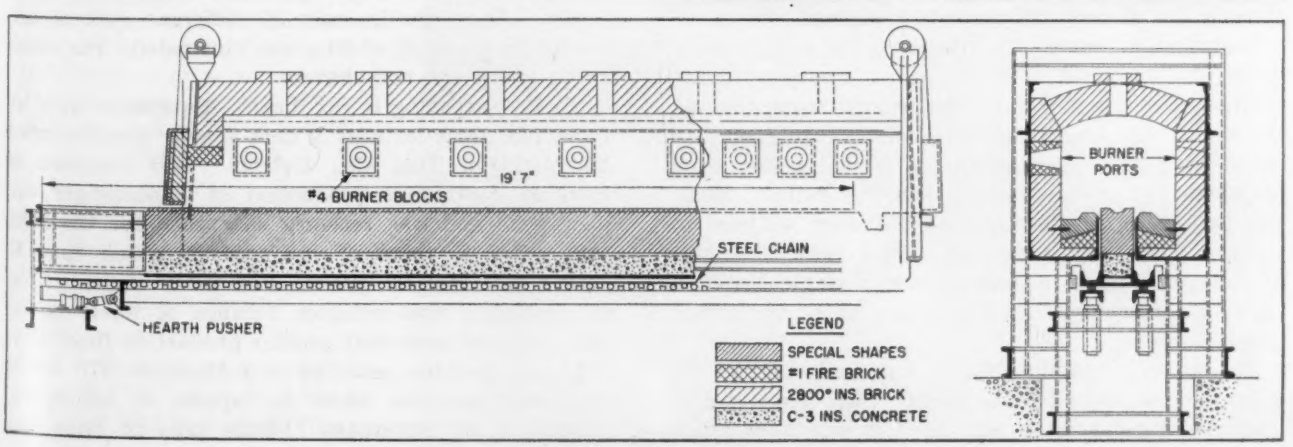


Fig. 1 (below)—Side and end cross sectional drawings of walking beam continuous forge furnace. Hearth elevating mechanism not shown

Fig. 2 (right)—View showing position of gas-fired furnace in relation to hammer. Heated bars leave furnace on a conveyor, from which they may be conveniently picked up by hammer operator



rests or rails are of the same refractory materials, and the chamber bottom is oil or water-sealed.

Furnace is lined above the hearth level with insulating fire brick, thus allowing fast heat recovery, rapid cooling, and fuel economy. The lift and stroke of the beam is variable so that the furnace can be used for heating practically any sized bars up to 1½ inches in squares, rounds, or flats, and in lengths from 12 to 30 inches. The hearth is 2 feet 9 inches wide, and 15 feet 2 inches long, making an effective hearth area of approximately 40 square feet.

Heated by 12 Burners—With the present setup, production is about 2200 pounds per hour; 138 blanks are in the furnace at one time on 3-inch centers. They are in the furnace for about 20 minutes heating time on a 7-minute step. The bars are heated to 2250° F during their travel through the furnace by twelve 1½-inch Sticktile burners, six on each side, operating from a low pressure mixer. The burners have a total capacity of 5,400,000 Btu per hour. Automatic temperature controls together with safety equipment are included in the installation.

After the bars have completed their travel through the furnace, they are swiped from the discharge end of the beam, but still inside the furnace chamber, onto a single strand chain conveyor which runs at right angles to the walking beam. This conveyor delivers the work stock at a position convenient to the forging press operator. The furnace, in heating the stock to 2250° F, produces no slagging of the steel or of the refractories, and the scale on the work is so slight that no trouble is anticipated.

STANDARDIZATION and INTERCHANGEABILITY

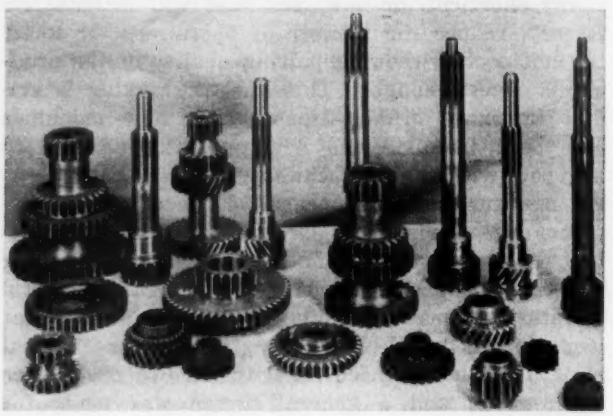
Enable Few Gear Cutters To Machine Many Gear Types

BENEFITS of "mass production" of many types of gears, each produced in "job-lot" quantities, are obtained at Canadian Acme Screw & Gear Co., Toronto, Ont., by designing gears so that a maximum number of gear types can be finished with a minimum number of cutters. Further consideration is given to selecting a finishing machine with minimum cycle time and requiring minimum time for tool changes.

Clever tool and equipment selection and gear design have resulted in ability to use two cutters for finishing 25 different gears for several types of truck and farm equipment transmissions. Only 12 quick-interchangeable cutters are required to finish the gears for three light duty truck and three passenger car transmissions, plus the 25 gears mentioned before. Finishing of these gears is by a machine cycle of only 20 seconds per gear.

Modification Saves—To illustrate its technique of mass production of "job-lot" gears, company points to the gears for a well-known tractor transmission. Gears in this transmission consist of a group of standard gears and a group of special gears, each of which require a separate shaving cutter. Modification of preshave hobs and shaper cutters to remove 0.020-inch additional metal from the root of the gears make it possible for a single modified shaving cutter to be used to shave all of the transmission gears.

Extension of standardization was made beyond the gears for a single transmission. The same cluster gear and second-speed gear used in one light truck



Of the 32 types of gears which require shaving, Canadian Acme uses only 12 cutters to perform the machining. The same gears, with different drive pinions, are used in different types of equipment, this standardization reducing cutter requirements

transmission are also used, with a different drive pinion, for another make of light truck transmission. Another cluster and second-speed gear, with two different pinions, serves for the transmissions of three different passenger cars, one of which is a fluid-drive type.

A third type of standardization is between gears for different classes of equipment; the pinion and cluster gear for a reaper-thresher transmission are finished with the same cutter used to finish a cluster gear plus three different pinions for three makes of trucks. As a result, only 12 different cutters are needed to shave 32 of 39 gears illustrated. The other seven gears are not shaved.

No Resharpening in Six Years—Equipment used at Canadian Acme includes a rack shaver manufactured by Michigan Tool Co., Detroit. This machine is used on continuous production of a passenger car idler gear and was recently sharpened for the first time after 6 years of use, during which time it turned out 300,000 gears. For most of its gears, the company uses rotaries because of lower initial tool cost and somewhat greater production flexibility.

Latest machine installed is a Michigan 870 series three-way machine which is capable of underpass, transverse or traverpass (*Please turn to Page* 92)

ZINC DUST COLLECTED

. . . by new system installed at pipe galvanizing plant

By G. E. BROCK
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and
D. B. SHINDLER
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Pittsburgh

DIP method of galvanizing pipe presents a dual production problem—removing excess spelter from the inside of the pipe, and reclaiming excess zinc and zinc oxide.

Best method yet found to remove excess zinc from inside pipe is by a blast of high pressure steam. This operation, good though it is, creates a hazardous fume condition in that the steam combines with the zinc oxide to liberate hydrogen—a dangerous fire hazard. In addition, the zinc dust and fumes are untenable unless confined to a very restricted area or removed through a properly designed dust collecting system.

At Jones & Laughlin Steel Corp., Aliquippa Works, such a system has been in operation for more than a year. It is the result of co-ordinated efforts of the engineering department of Jones & Laughlin and of Westinghouse's Sturtevant division.

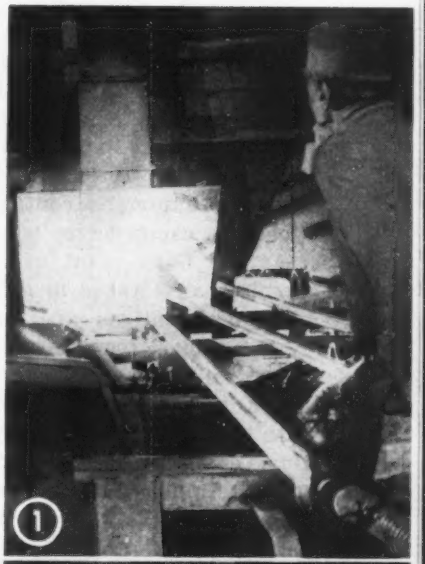
This system consists of a special designed blow-box or collecting hood, which traps the zinc oxide dust and allows the metallic zinc to fall into a collecting pan. This metallic zinc is reclaimed for future use. Fig. 1 shows the blow-box before the system is put in operation. Note the cloud of zinc dust and moisture at the far end of the pipe as a blast of high pressure steam is introduced. Fig. 2 shows the same blow-box with the system in operation.

The trapped zinc dust is conveyed through a system of heavy gage steel ducts to a special cycloned dust collector located in this case, approximately 100 feet from the blow-box. The velocity used in conveying this dust eliminates any possibility of its settling and clogging the system.

Fig. 3 shows the special cyclone collector. Zinc dust from the collector is fed to a drum through the medium of an air tight rotary valve feeder. Main artery of the system, the fan, is located in a fan house adjacent to the cyclone collector as shown in Fig. 3. Fan is on the clean air side of the cyclone and thus eliminates the possibility of excess erosion or loading of the fan impeller.

Fan in this installation is of special heavy duty construction and design and is directly driven through a coupling by an a-c induction motor. Air, after passing through the collector and fan, is discharged into the atmosphere through a steel stack shown partially in Fig. 3. Continued observation of the discharge air from stack under varying loads shows absence of zinc dust.

It has been proved that with a system of this type, the installation cost can be recovered in a very short period by the following savings: 1) Maintenance; 2) reclamation of zinc oxide for resale as a by-product of the process used in pipe galvanizing; 3) elimination of occupational hazards; and, 4) reuse of metallic zinc.



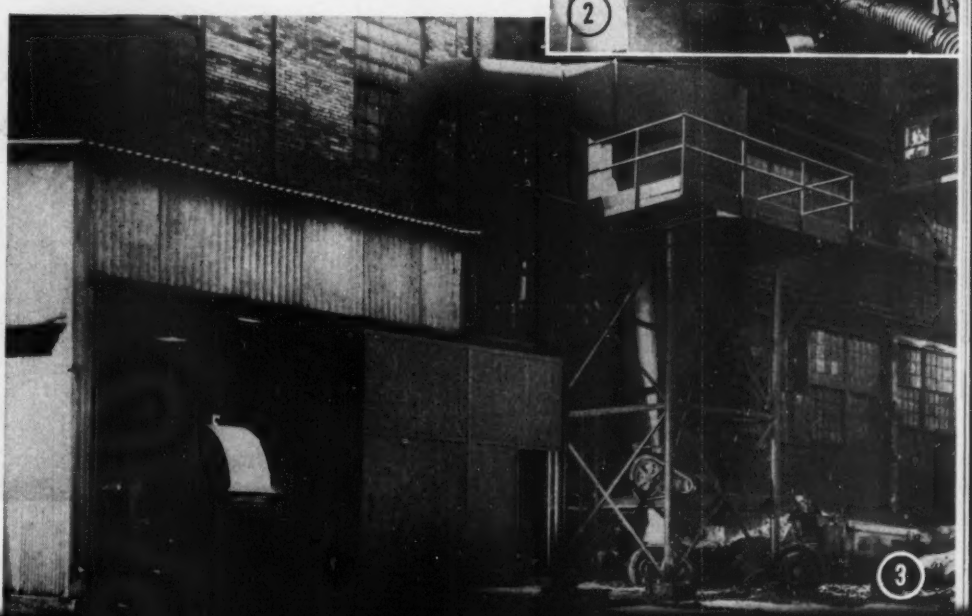


Fig. 1—Square collecting hood and circular duct in background are part of the zinc dust collecting system. Fan is not operating. This accounts for the cloud of zinc dust and steam at mouth of collecting hood

Fig. 2—With the fan operating, zinc dust and steam are almost completely absent from the high pressure blowout

Fig. 3—Special cyclone dust collector is shown at right, while fan is located in house at left

RAPID-RESPONDING DEVICES

Control High-Speed Reheating of Seamless Steel Tubes

Successful regulation of new high-gradient heating process at National Tube's Gary plant is made possible by radiation pyrometers

By H. W. COX
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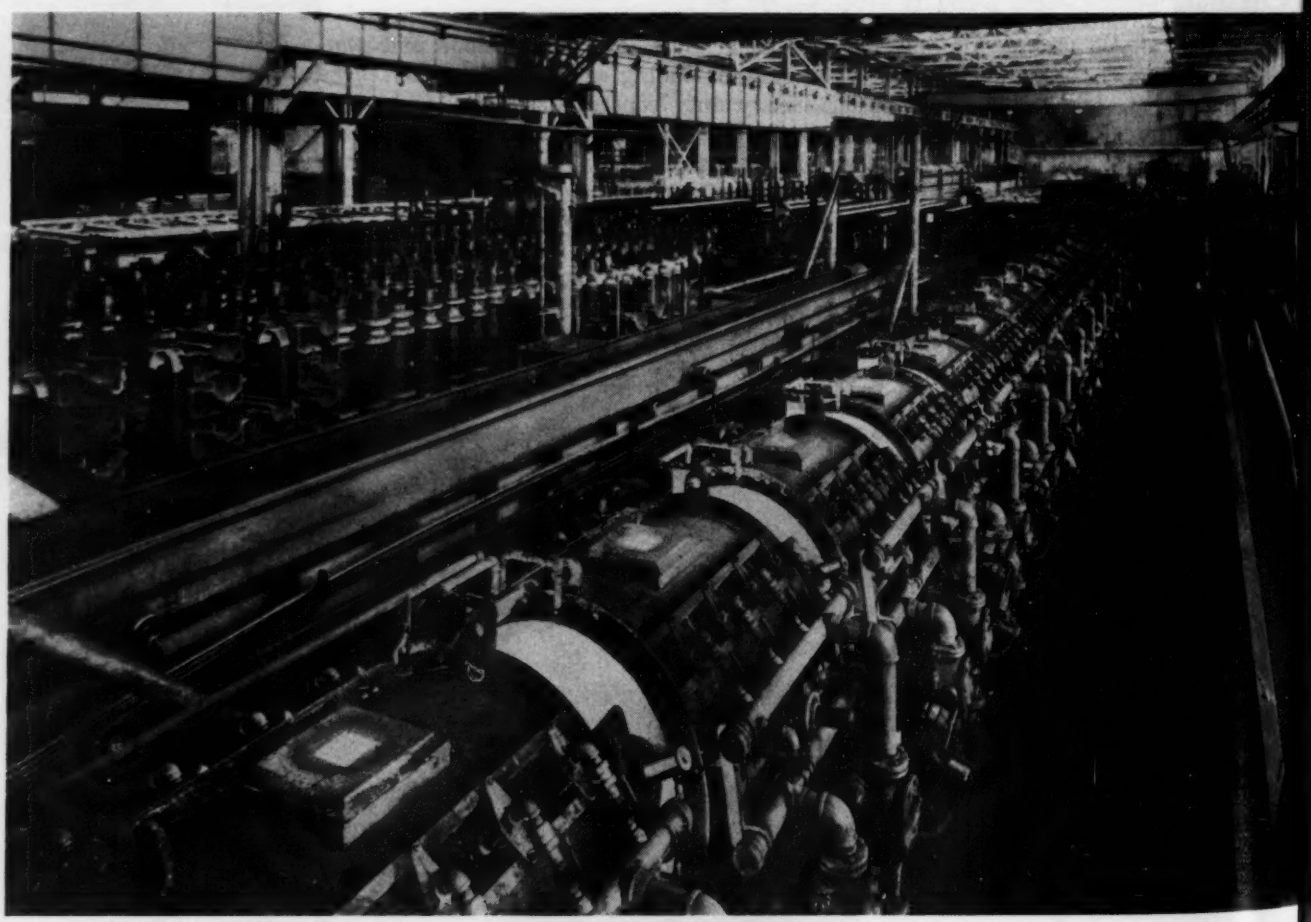
Gary, Ind.

COMPARATIVELY recent introduction of high-gradient heating to the steel industry brought with it the need for a temperature sensing device of very rapid response. Experience has proved the value of the radiation pyrometer in solving this problem. Effective automatic control without the aid of this type of sensing device would be extremely difficult.

At the Gary plant of National Tube Co., where seamless steel tubes in a large variety of sizes and alloy compositions are made, reheating the tubes to the proper temperature required for final sizing is one of several critical processes in manufacturing a product of the highest quality. Contrasted with the formerly conventional low temperature, long-time batch or multiple reheating methods is the new continuous high temperature, fast speed line of 13 furnaces installed at Gary. A tube entering this line of furnaces just after passing through the piercing and reeling operations requires, on the average, only 0.487-minute to attain the desired sizing temperature at the exit end.

Furnace and burner design, plus an efficient system of air-gas compression and carburetion, provide what might be termed accelerated combustion. Heat releases from 3 million to 45 million Btu per cubic foot per hour, are attained in the Selas equipment. In this type of furnace, more fuel is burned in a given space than in the conventional reheating furnace, resulting in higher furnace working temperatures. Since metal heating is principally a function of time

Fig. 1—Battery of 13 Selas annealing furnaces for seamless tubes



and temperature, it is obvious that a higher working temperature greatly reduces the time required for materials to remain in the furnace. In addition to high speed and savings of time, uniformity of heating, less handling and less scale formation, and lower fuel consumption are claimed for this method of heating.

A radiation detecting element is located at the entrance end of each of the 13 furnaces. These elements sight on the moving tube just as it enters the furnace. The fuel supply to the furnace is adjusted by a recording electronic potentiometer pneumatic controller, to which the radiation detectors are connected.

The control system is illustrated schematically in Fig. 2 which shows the basic instrumentation for all furnaces. Note that radiation detectors *R* are electrically connected to potentiometer controllers *TRC* for each furnace. These instruments throttle diaphragm motor valves in the premixed air-gas supply manifolds. Experience has indicated that an instrument with a narrow proportional band (2 per cent) is satisfactory for this application which has a very high supply capacity with reference to comparatively small load changes. The instruments, calibrated from 800° to 1900° F, are equipped with control by-pass panels for convenience when manual control is required. The instrument panel is illustrated in Fig. 3.

With tubes moving through the furnaces (effective length, 73 feet) at a rate of about 150 feet per minute, any given increment of tube is in each furnace only about 0.037 minute. It is because of the extremely rapid response of the radiation detector, plus the very fast reaction of the furnace temperature to a change in fuel supply, that effective automatic control can be maintained. Under good average conditions, the tubes leave the final furnace at a temperature within plus or minus 20° F of the instrument set point.

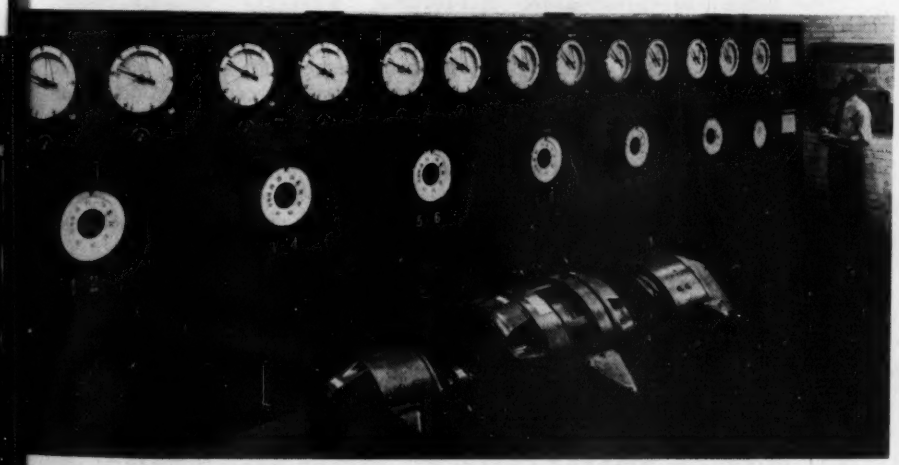
The radiation detector comprises chromel-constantan thermocouples connected in series to form a thermopile. Radiant energy is focused onto the thermopile by means of a lens built in the detecting device. These detectors incorporate fittings for air cooling.

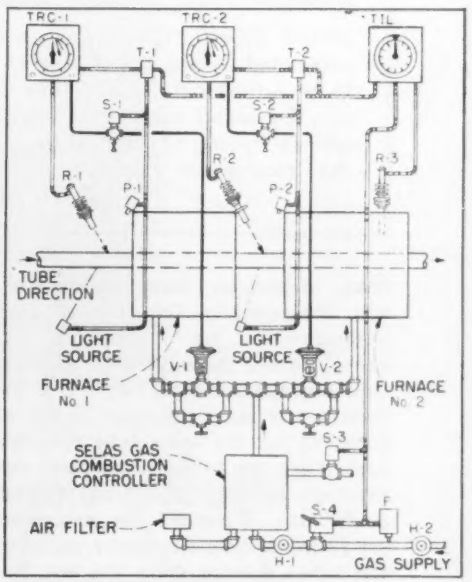
Temperature Gradient Set Manually—Set point of each of the tube temperature controlling instruments is adjusted manually for each size and type of tube being run. Large, heavy wall tubes require more

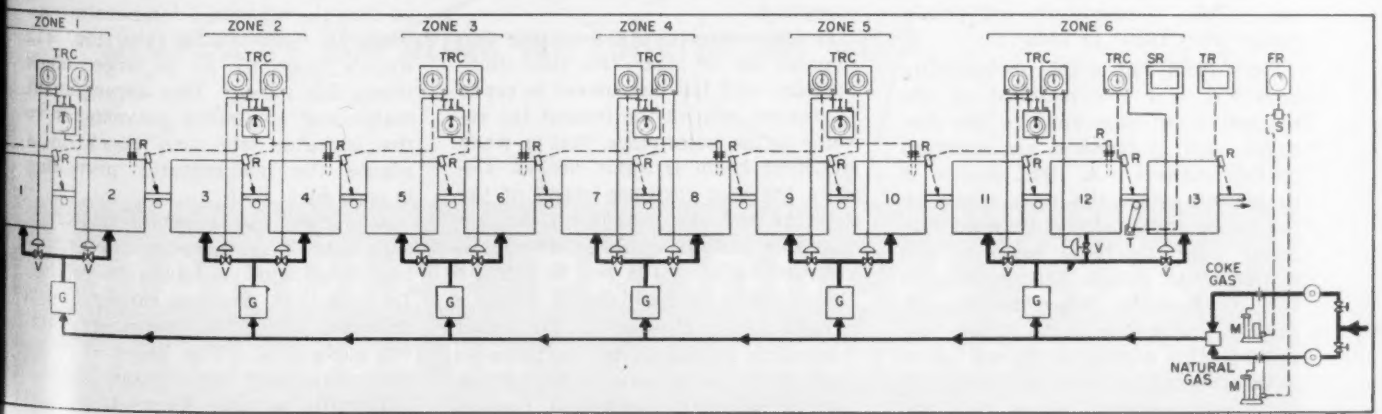
Fig. 2 (bottom)—Schematic drawing of 13 Selas furnaces, showing major instrumentation

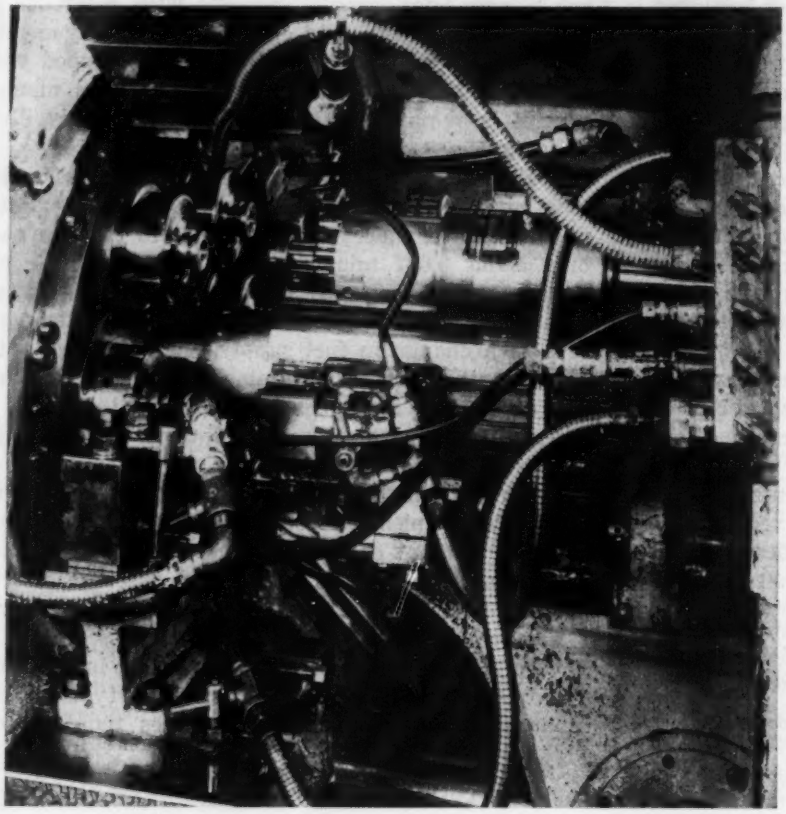
Fig. 3 (top)—Master panel of Brown controlling instruments, showing electric generator for conveyor roll power in foreground

Fig. 4 (right)—Schematic illustration of instrumentation for one complete heating zone. Figs. 2 and 4 courtesy Brown Instruments Division, Minneapolis-Honeywell Regulator Co.









DRILLS EIGHT HOLES: Expense of a secondary drilling operation is eliminated by this application of a multiple spindle gearless drill head to an Acme-Gridley 1¼ inch RA-6 screw machine. Made by Zagar Tool Inc., Cleveland, the head drills eight 5/16-inch holes in steel during the general cycling of the machine prior to the part being cut off. The head itself rotates with the stock and the drills are turned relative to the stock to perform the drilling operation

heat, of course, than lighter stock and consequently the furnace temperatures are set higher for such runs. Rather than different temperature settings for each furnace, it has been found most practical to set all furnaces for the same tube temperature, since the tubes make their own gradient as they pass from furance to furnace. Provided the instrument set points are thus properly adjusted, the tubes emerge from the last furnace in the line at exactly the desired temperature required for sizing. Tube temperature set points range from 1650° to 1800° F.

Note from Fig. 4 the photoelectric cells P-1 and P-2 installed at the respective entrance ends to the furnaces. All 13 furnaces are equipped in this manner. A light source is so located under the path taken by the tubes when passing between furnaces that the light beam to the photoelectric cell is broken when a tube is present. When no tube is present, with the light beam unbroken, the photoelectric cell actuates, through time-delay relay T, three-way solenoid valves S-1 and S-2, automatically cutting the furnace back to minimum fire by bleeding air from the diaphragm motor valves V-1 and V-2 in the premixed air-gas manifold line.

A by-pass line, with a manually operated valve, is installed around each diaphragm motor valve to permit minimum fire to be maintained when the diaphragm motor valve is closed. At the same time, the instrument balancing motor is de-energized. The electronic power pack in the instrument, however, remains energized.

In this manner, the recording pen remains at or near the tube temperature and the instrument is ready to assume control the instant the reverse action takes place, that is, when the light beam is again broken. Despite the fast response speed of the detector and the instrument, an undesirable instant would otherwise be required to bring the pen to indicate the new tube temperature.

High Limit Control — To afford maximum protection to the tubes as well as to the furnace proper, a system of automatic high-limit furnace temperature control is provided. The line of 13 furnaces is divided into six zones insofar as this protection is concerned. The first five zones each comprise a pair of adjacent furnaces. The sixth zone comprises the last three furnaces—that is, Nos. 11, 12 and 13.

Note that radiation detectors R are located in furnaces Nos. 2, 4, 6, 8, 10 and 12 for the respective zones Nos. 1 through 6. Although only one furnace in a given zone is used as the criterion of temperature measurement for that zone, the instrument controls all furnaces in a particular zone.

Details of the high-limit control system can be observed by referring to Fig. 4 which is concerned specifically with zone No. 1. Radiation detector R-3 sights into an air-cooled silicon carbide target tube which is mounted through the furnace wall. This detector is connected to a circular scale indicating electronic potentiometer, calibrated from 1200° to 2900° F. This instrument is equipped with three adjustable electric contacts to provide the following control action.

Should the temperature at which the first contact is set be exceeded, three-way solenoid valves S-1 and S-2 are de-energized causing the furnaces to be put on minimum fire. Should the temperature continue to rise, causing the second contact to be made, solenoid valve S-3 is energized, permitting air to bleed into the combustion controller and leaning the gas-air mixture. Finally, should the temperature still continue to rise, causing the third contact to be opened, solenoid valve S-4 is de-energized, cutting off the supply of gas entirely.

Points Fixed Manually—Temperature high-limit set points are fixed manually at the start of a run and, as with the tube temperature controllers, vary with the type of material being processed. Normally, the high-limit temperatures are within the range of 2400° to 2600° F.

In the temperature high-limit controllers, the instrument scale rotates so that the measured temperature always is indicated at the top (12 o'clock position) by a large, black triangular index. This arrangement makes for maximum convenience to the operator who can check in a glance the temperatures prevailing in each zone.

A supply gas pressure switch F acts only if pressure on the supply line falls below a minimum setting. In such case, the gas supply line is automatically closed by safety shut-off valve S-4. This solenoid valve will also close upon power failure.

Records of Gas Flow—Important

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from the standpoint of cost accounting is the amount of gas consumed by this large installation of furnaces. To provide the necessary information for such accounting purposes, as well as to afford a convenient check regarding proper gas flow, a recording-integrating flow meter is used in this installation.

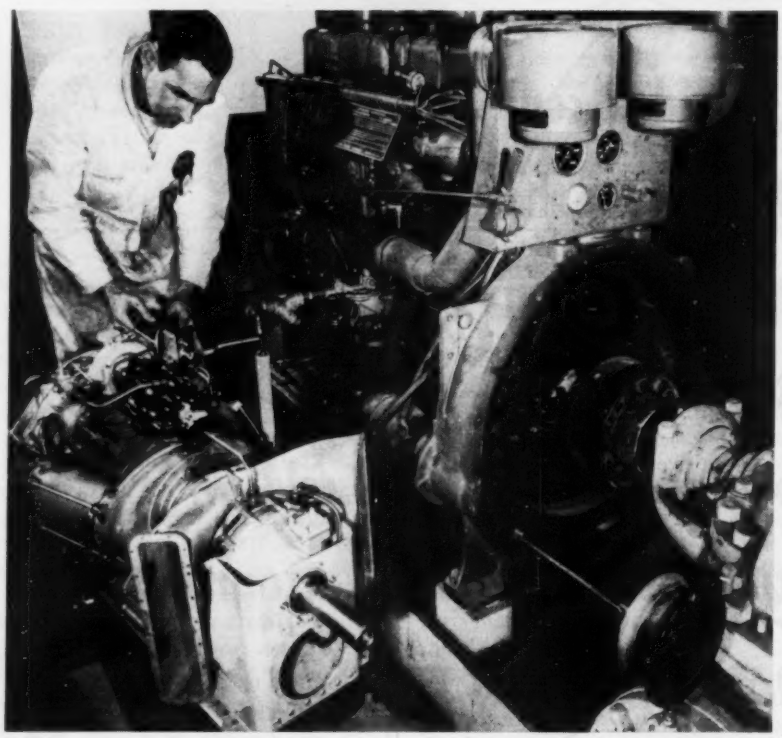
As shown in Fig. 2, one main gas line supplies the installation. Separate orifice runs are provided for natural gas and coke oven gas. Electric flow transmitters M, for measuring the flow in either line, can alternately be connected to the receiver-recorder that is located on the main instrument panel through selector switch S.

Referring to Fig. 2, note that an electronic recording tachometer SR continuously charts the speed at which tubes pass through the line of furnaces. The tachometer generator T is connected to the roller conveyor line at the discharge end of No. 12 furnace. This information is valuable to the operator and also serves for useful checking purposes later by the quality control department.

Each conveyor roll is individually driven by a variable speed motor. Power for these rolls is furnished by the motor generator set that is located in front of the master control panel.

The line speed normally is set manually by means of a single rheostat control. An automatic speed control system is incorporated for use, however, when alloy and stainless steel specialties are being processed. This system functions as follows: 1. Tube enters furnace at rate of 240 feet per minute until rear end of tube passes photoelectric cell at entrance end. 2. Speed of furnace conveyors is decreased to a preset low rate as determined by heating requirements. 3. Lead end of tube emerges from furnace No. 13, breaking light beam to photoelectric cell. This action causes conveyor speed to increase, ejecting tube from furnace to the sizing mill.

As illustrated in Fig. 2, single-point, strip chart recording potentiometer TR continuously logs the final temperatures of the tubes as they emerge from the line of furnaces.



DYNAMIC YET DIMINUTIVE: The gas turbine may be expected to replace largely the reciprocating engine in land and water vehicles and as a stationary or portable power source, according to Edward C. Wells, vice president for engineering of Boeing Airplane Co., Seattle. His observations are based on the company's work with two lightweight turbine engines, one of which is illustrated at left. It has approximately the same horsepower as the industrial engine at the right, used to drive a standby pump. Attributes of this power plant are reported to be simplicity of design, light weight, small volume and ability to develop full power even when stalled

New Forming Method Cuts Cost

COST of silver brazing preforms, used for various fusing, bonding, brazing and soldering operations, is undergoing sharp reduction because of a new method developed for the coining of silver alloy washers. The process, announced by Lucas-Milhaupt Engineering Co. of Cudahy, Wis., forms a washer by subjecting round wire rings to 180,000 psi between polished dies. Only as much of the silver alloy is used as is necessary to form the washer.

Washers may be produced in a variety of shapes and sizes according to individual specifications and are available in Easy-Flo and Sil-Fos. Coined washers are suitable for silver brazing, soldering or joining of metals that usually require costly silver alloys.

Because flat rings fuse into metals more readily, forming a more perfect bond and seal, they are seeing expanded use in joining fittings for drain plugs on crank case pans, differential housings and fluid drive seals. They are also being used for bonding and joining applications in the refrigeration, heating and air conditioning and other equipment manufacturing industries where strong joints or airtight seals are essential.

Ultrasonic Service Offered

DAY-TO-DAY testing with an ultrasonic Reflectoscope operated by a service engineer is a service being offered by Sperry Products Inc., Danbury, Conn., either in the field or in the company's plant. For metal producing, processing and fabricating plants and for maintenance inspection, the service is rendered by Sperry service centers located in most industrial localities.

Instrument is used for locating defects in steel, iron and various nonferrous metals by applying a quartz-crystal searching unit to an outer surface. Internal defects are indicated on a cathode-ray oscilloscope. According to the company, a trained operator can locate an indicated defect accurately as well as determine its approximate size.

Demonstrate Foundry Practice

CHICAGO Chapter, American Foundrymen's Society, started a series of demonstrations of modern foundry practice Jan. 9. Six semimonthly sessions dealing with sand, molding, coremaking, melting and pouring, cleaning of castings and inspection of castings will be held at Peoples Gas Auditorium, Chicago.

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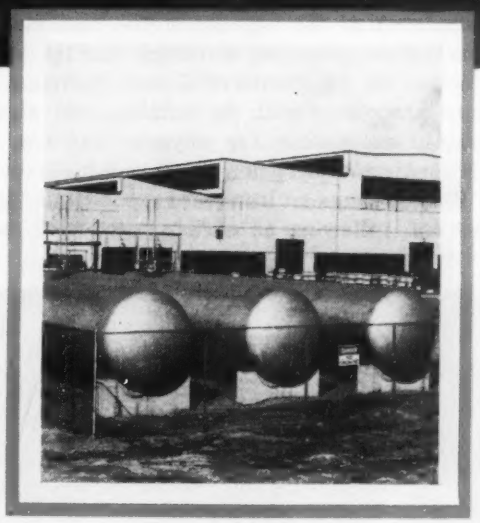

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FUNDAMENTALS OF STEELMAKING

NUMBER **18** OF SERIES

Another in a continuing series of articles on the making of steel and finishing it into products ready for the consumer. Each article is written by an outstanding authority in his particular field.

By KENNETH B. LEWIS
Consulting Engineer
Worcester, Mass.

Production of WIRE AND WIRE RODS

During the last 50 years, design of the wire galvanizing unit has remained fairly well standardized. Solid fuels gave way to fluid, pyrometers and automatic heat control have taken much of the human element out of success, and the number of strands per unit has crept up from about 20 at the turn of the century to about 36 to 40 now, with tentative trials at 48

PART III

PRE-EMINENCE of zinc as a protective covering for steel is due chiefly to its marked electro-negativity toward iron. In the presence of moisture a galvanic couple forms at any discontinuity of the coat, and the zinc rather than the steel is attacked. This sacrificial attitude is reversed in the case of the other common metals, lead, tin, or copper, which will save themselves at the expense of the base metal. Of the two other potential covering metals, cadmium is blocked off by commercial and technical considerations associated with its refining, and aluminum has evinced an avidity for oxygen that has driven experimenters to despair.

Zinc coatings on iron were reported as "interesting" in 1741, following an earlier practice of coating with tin; commercial development proceeded at a normal rate and by 1830 the name "galvanizing" had been fixed on the process. At first the wire bundles, which at that time seldom exceeded 14 pounds, were dipped and shaken by hand but by 1840 strand operation had been tried. Pickling and fluxing were done while material was in coil form, which was put onto reels wet, and which, as bundles gradually grew heavier due to the demands of the telegraph promoters and the speeding up of rod mills, began to rust badly.

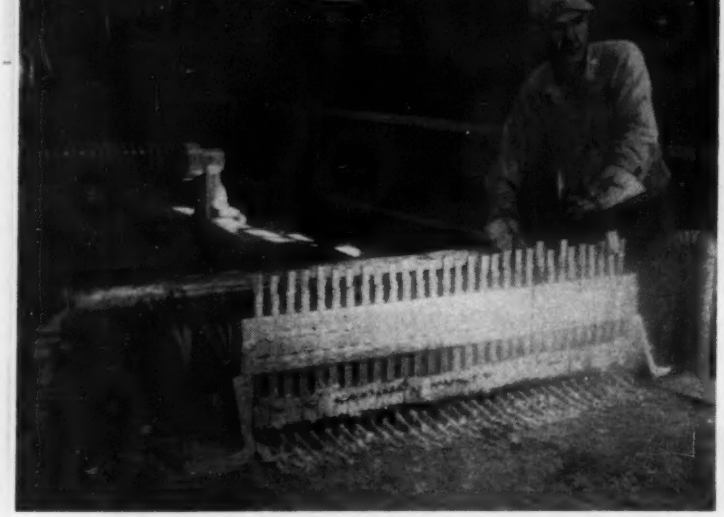


Fig. 15—Wires rising from zinc bath and passing through wipers; quenching jets are located behind the wipers. Continental Steel Corp. photo

In 1860 George Bedson of Manchester, England introduced continuous annealing in process, which made a great hit with the telegraph people as the wire was about 15 per cent stronger than the pot-annealed product. This was of course wrought iron. Fence also provided a fair market for galvanized wire. Even after the advent of barbed wire about 1876 the zinc coat was pretty heavy. The bath was usually covered with a bed of sand, which acted as a wiper at the point of exit. Charcoal was introduced as a wipe about this time; it really didn't wipe, but it gave a protective vapor at the critical point and promoted cleaner and smoother coatings.

As competition began to affect barbed wire, about 1880 to 1890, various mechanical wiping devices were proposed, patented, and adopted, based chiefly on asbestos pads pressed against the wires by springs, screws, or weighted levers. There occurred a division of galvanized wire into two classes called sometimes tight wiped and charcoal wiped, or more commonly single and double galvanized, the latter indicating merely that the vertical exit through a charcoal bed had left about twice as much zinc on the wire as was present on tight-wiped stock.

For the past 50 years or more, the wire galvanizing unit has remained of a fairly well standardized design. Solid fuels gave way to fluid, pyrometers and automatic heat control have taken much of the human

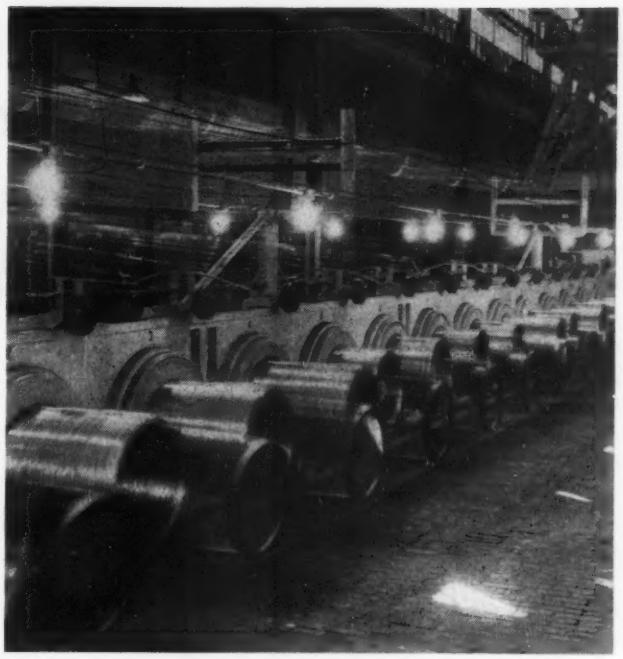


Fig. 16—Galvanized wire on take-up blocks; structure in background facilitates vertical withdrawal for charcoal wiped (unwiped) wire. Continental Steel Corp. photo

element out of success, and the number of strands per unit has crept up from about 20 at the turn of the century to about 36 to 40 now, with tentative trials at 48. There is first a group of free reels then an annealing furnace, usually a lead bath at about 1300°F, or more often two baths, the second running at a lower temperature to check the drag-out of lead. The wire is cooled in water, pickled in 50 per cent muriatic acid (sometimes heated), rinsed, fluxed with ammonium chloride, or zinc-ammonium chloride, neutral or very slightly acid, dried over a hot plate, and passed through the molten zinc which is held at a temperature slightly above its melting point.

Held down under sinkers at both ends of the kettle, for double galvanizing the wire rises vertically through a bank of charcoal, and for wiped wire is passes out of the kettle at an angle through the asbestos pads and is then chilled by water jets. In either case it reaches the take-up blocks, which rotate on horizontal spindles, and which, though provided with clutches, are commonly stripped of their load while in operation to avoid complications entailed in the freezing of the wire in the asbestos pads. This is a continuous process, and bundles are either welded or twisted together at the reels. The whole unit, with working space, runs to at least 300 feet in length, preferably more. Production has risen, in our time, from under two to nearly three tons of wire per 24 hours in fence sizes.

Desirable attributes of a zinc coat on wire are, in brief, good adherence to the base, flexibility, attractive appearance, pre-calculated thickness, and uniformity. To secure these ends in greater measure there have been instituted during the past 30 years a number of modifications and refinements of the process. They were paced by electrogalvanizing, known and practiced sporadically for many years but coming into prominence only in recent decades. Two processes have taken shape, one based on the use of metallic zinc anodes, the other on leachings from the zinc ore and insoluble anodes. The electrodeposited coating is uniform, closely controllable as to thickness, and can be made attractive in finish. The fact that there is no bond between the two metals seems not to impair the value of the wire, which can be drawn nicely with its coat, and though the cost is thought to be rather on the high side, the product holds its own in the competitive market, being particularly strong in the ultrathin and ultrathick coats, outside the normal range.

Stimulated largely by the competition of the electro processes, a number of modifications of the hot process have appeared. Best known is the Crapo process, based on the passage of wire before coating through a bath of fused salts containing cyanides. Zinc etches iron as would an acid, and, like acid, it acts most vigorously on iron carrying plenty of alloying elements. Wire to be galvanized is usually as nearly pure as commercial practice allows, and resists bonding with zinc, but the cyanides seem to produce an

ultrathin, probably discontinuous film of carburized and nitrided metal on the wire, and the result is a differential rate of attack and a dove-tailing of zinc into the iron surface which ensures excellent adherence.

In the "flame-sealed" process the wire is wiped roughly by passage through metallic orifices which leave a closely calculated amount of zinc which is then uniformly distributed and perhaps diffused into the base by treatment through a series of flames. At the speed of wiped wire the process secures a thickness somewhere between wiped and unwiped wire.

Galvannealed, earliest of the named brands, is coated heavily and then annealed at a high temperature, that is, higher than the melting point of the zinc. This treatment, in between the zinc bath and the take-ups, diffuses the two metals into each other and promotes long life.

The inventor of galvannealing has recently brought out another, the Herman process. In making this wire the front sinker is replaced by a "machine" which is an auxiliary spelter tank with a nozzle-shaped slot across its bottom. This tank is submerged in the regular bath, and a motor driven impeller pumps zinc continually out of the auxiliary tank so that fresh unoxidized zinc is always spouting up through the slot. Through this fountain the wires rise, into a gas-filled chamber, from which they emerge vertically through water jets which chill the bright zinc before the air reaches it. The wires retain a brilliant finish which, being free of oxide, can be drawn as readily as electrogalvanized wire. A peculiarity of the process is that as wiping is by gravity alone a high speed results in a heavy coat. The bond is firm but very thin, for the immersion is short, there being no effort to let the wire reach the bath temperature. For this reason the process is excellent for rope wire, or any other whose proper-

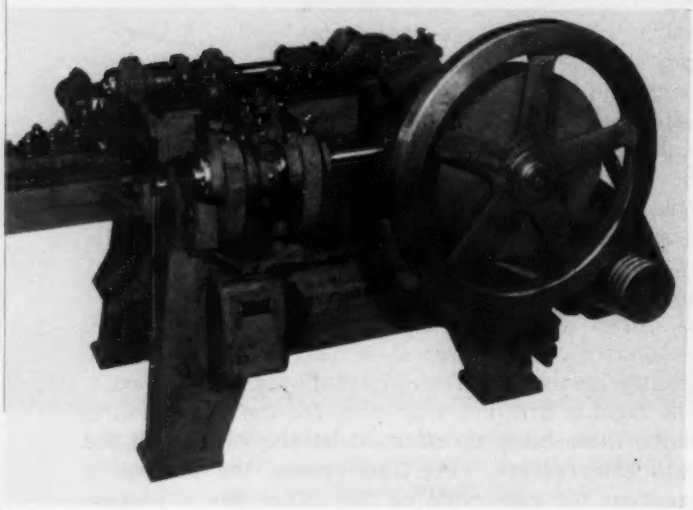
ties are liable to be impaired by heat. The coat is pure zinc. Speed in general lies between that of wiped and of unwiped wire. The natural range is for coatings from 0.6 ounce per square foot upward, and the fence grades, which range down to half this weight, cannot be economically produced.

Strictly speaking, wire products, of which there are literally thousands, have no place in this chapter, but there are two that have always been so intimately associated with the wire mills that they must be briefly noticed. These are nails and fence. They came into the industry about 60-odd years ago, but jointly they constitute nearly half the average mill's output.

Wire nails came to us from Europe and lost no time digging in. Many a man still active in industry remembers when the word nail meant a cut nail, and a wire nail had to be qualified by the adjective. In the early days nail makers were wire buyers but the wire mills soon absorbed the business. This development was stimulated by the discovery that scratched and off-size wire and shorts, of which there was a great plenty in the dark days before the carbide revolution, nay even off heats, oversize rods, piped and segregated steel, in fact practically any form of mill casualty, could be buried in the nail keg. Quite naturally every wire mill ran a few nail machines for the purpose, drawing expressly for nails only such wire as was needed to round out orders. This led to an unhealthy situation, in which nail cost could be any figure arbitrarily chosen by the management, and prices whatever the purchasing agent felt like paying. For many years, in fact up to the time World War II upset all such relationships, nails were regularly listed at a price lower than that of wire. It is improbable that that relationship will ever be resumed.

Manufacture of nails is simple. Hard-drawn wire passes from the reel through straightener rolls and is seized by a pair of jaws which hold it tightly, incidentally impressing upon it the marks of their teeth, while a ram advances and flattens into the familiar nail head the short length protruding through the grips. These now loosen, the wire, pushed by the carriage that holds the straightener rolls, moves forward the length of the nail, the grips close on it again, a pair of cutters severs the wire and at the same time leaving on it the familiar point, and the nail drops into a container below. This cycle repeats at a speed of about 150 blows a minute for common sizes, and up to 600 for small brads. The nails are dumped into a rotating steel barrel where they are tumbled with sawdust until the small bits of metal clinging to the points, technically the "whiskers," are rubbed off, and the nails have taken a good polish that allows them to pack down well in the keg.

Fig. 17—Machine for production of wire nails. William Glader Machine Works photo



Nail making is generally admitted to be a backward process; nobody has cared about spending money in a losing game, but there are developments which almost certainly could be adapted to the art so as to vastly reduce costs. They will probably come into consideration when the labor situation again favors and permits technical advance.

Wire fence, in contrast to the nail, did not come into the average wire mill by absorption; on the other hand in most cases the fence mill developed to a point at which it needed and built a wire mill of its own, in fact often going on to acquire rod mills and even steel plants. Wire fence in the simple form of galvanized strands has a history of a century; barbed wire came into being in the 1870s in a tremendous burst of energy, industry, invention, and litigation, which echoed and re-echoed around the world. Its story would need not a chapter but a book.

Field fence came later. The barb fence followed close behind the pioneers as they broke the virgin sod of the prairies. But the second wave brought into the midwest a more mature husbandry, and a latent demand for something to hold small animals and poultry. The answer to this came from two directions.

J. Wallace Page of Michigan, after much patient experimentation with hand looms, succeeded, with the help of Charles Lamb, in mechanizing the operation, patented his discoveries thoroughly, and, as it later developed, successfully, and engaged in the weaving of fence. The market was ready and waiting; in no time at all there were a large number of looms humming day and night, and a still larger number of envious competitors sniping at the patents.

Among the more honorable of these were sundry inventors in the prairie states who brought out small machines which, operated by one or two men, and held up against a fence of horizontal strands already strung on posts, could, on being fed from a coil on a barrow and cranked by hand, weave a fence right in place. Sponsors of these little devices, at the earliest moment permitted by a broad interpretation of the patent laws, or even a bit sooner in some instances, flashed into production with looms of their own design, and grew like weeds. As stated, all mushroomed promptly into wire, some into rod, and even into steel mills.

There are infinite variations of mesh spacing; otherwise the chief variant is the knot, which divides them roughly into hinge joint and lock joint.

One who has delved into the early history of a

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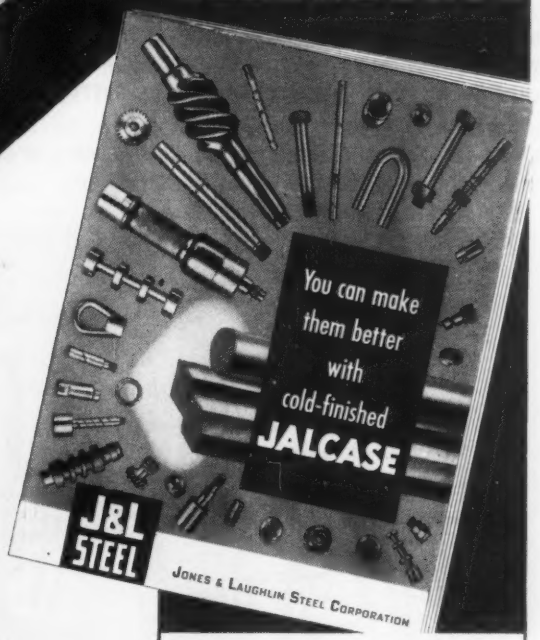

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craft and traced its development into the practices of today should be able to detect its trends. Prophecy, however hazardous, is generally interesting.

Rolling of rods has gone on from bold advance to bolder, and stands today in a quite harmonious relationship to the wire mill. Complaints are few. It is not improbable that the rod mill will, some day, take a leaf from the book of the sister art, and look into carbides. Carbide rolls, if their performance improved roll life a mere 1 per cent as much as it stepped up die life, would render null and void an almost endless series of awkward constructions, habits of thought, and compromises based on the certainty of rapid and extensive wear of grooves, which the world has come to take for granted, and deliver a rod with an accuracy of section approaching that of wire.

There is, always was, and always will be a cry from small producers and nonindustrialized countries for a rod mill of small output and moderate first cost. The trend has been the other way. In order to finish hot steel and deliver a rod of uniform size from end to end the mill must roll fast. Speed calls for automatic appliances, which are costly, and for refinement of detail, which is more so, and results in large potential output which must be realized in order to justify the investment. If either of these two desiderata ever is attained, (small mills and carbide rolls) it will probably be accompanied by the other.

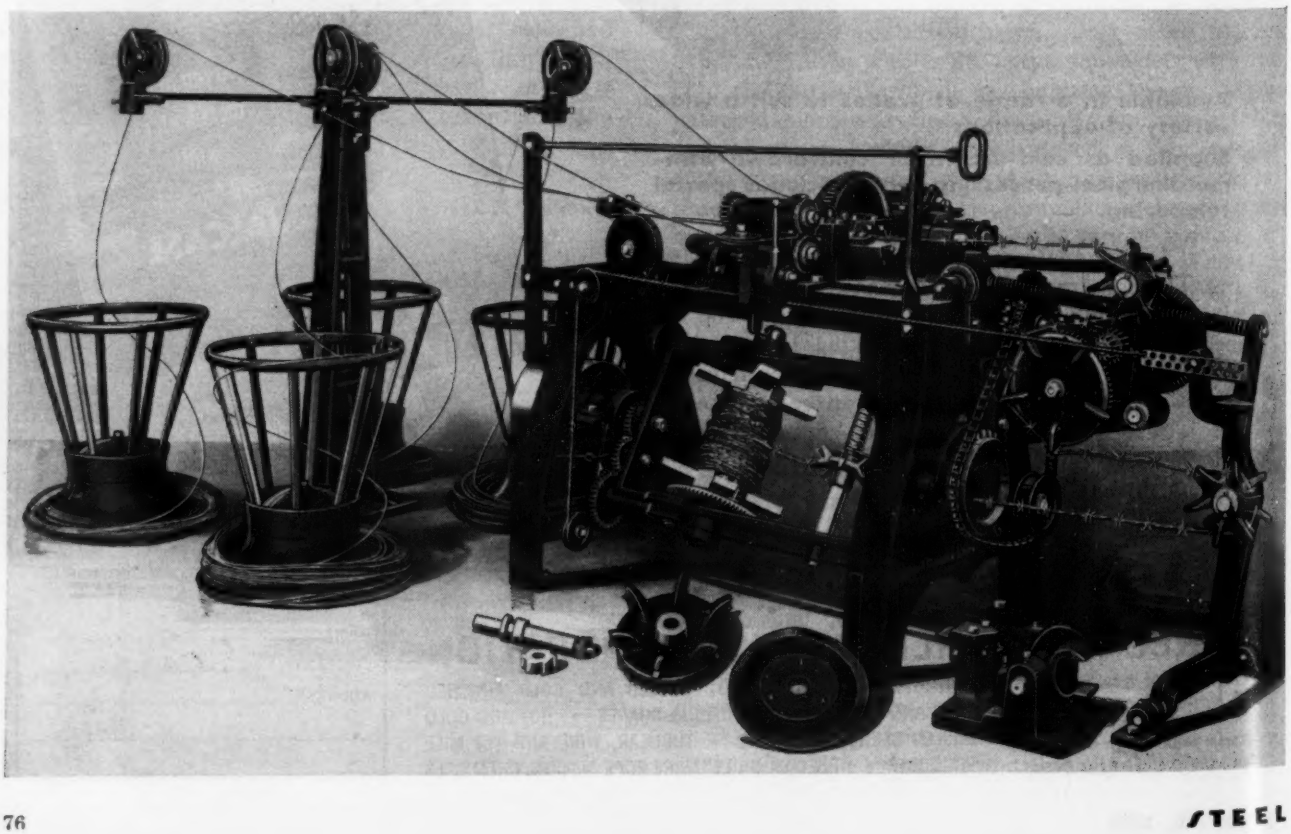
The cleaning house is now in excellent shape mechanically, and attracts a high type of operator. Two weaknesses, however, still stand out. The waste liquor carries away a tremendous lot of ferrous sulphate, whose recapture in marketable form costs more than it will bring. Those who recover it would as a rule prefer to throw it away but are prevented by local ordinances. Then there is the general dislike of a process involving acid, fumes, and general slop. Alternates are many in theory, few in practice. Various means have been worked out to reduce rolling scale back to metallic iron, but it develops that this is decarburized iron, which is not received with enthusiasm by either the wire mill or its customers. If scale is cracked off a rod by bending, and its powdery debris brushed away, the surface below is in good shape to gather and hold a soap powder, and good wire can be drawn. Rods have been descaled in this way ahead of a continuous wire machine with promising results and at fairly high speeds; something may come along this line; if so, it will rate hearty cheers.

Baking seems secure at present, though it may be eliminated by lime substitutes, and these products themselves will doubtless improve and enlarge their field.

Galvanizing has always been an illogical, sloppy, ill-controlled process. Wire is heated twice, with scaling, cooling, and pickling between. Is it too much to hope that some day spelter will be kept hot by calories brought over by the wire from its annealing? Or that the annealing can be done without scale? Cleaning of the running strand must be done quickly, which calls for strong hot muriatic acid whose fumes are a problem which often causes a galvanizing department to be located, not so much for the sake of streamlining production, as to get it away from wire in storage.

The relationships between iron and molten zinc are embarrassing for both. The steel kettle dissolves,

Fig. 18—Unit for fabricating barbed wire. William Glader Machine Works photo



REPRINTS AVAILABLE

REPRINTS of previous individual chapters in the series "Fundamentals of Steelmaking" now may be obtained by addressing Readers' Service Department, STEEL, 1213 W. Third St., Cleveland 13, O. Prices range from 20 to 75 cents per reprint. Subjects covered over the past few months include:

No. 1, Production of Electric Arc Furnace Steel; No. 2, Scrap Iron and Steel; No. 3, Production of Open Hearth Steel; No. 4, Production of Tool Steel; No. 5, The Art of Roll Pass Design; No. 6, Production of Bessemer Steel; No. 7, Production of Metallurgical Coke and Resultant Coal Chemicals; No. 8, Production of Plates; No. 9, Production of Hot and Cold-Rolled Strip and Sheets; No. 10, Production of Tin Plate; No. 11, Production of Structural Shapes and Rails; No. 12, Production of Butt and Lap Welded Pipe, Conduit and Electric Metallic Tubing; No. 13, Production of Pig Iron; No. 14, Production of Seamless Steel Pipe and Tubes; No. 15, Production of Stainless Steel; No. 16, Iron Ore—Its Mining, Beneficiation and Reserves; No. 17, Transportation and Handling of Iron Ore.

and occasionally dumps its load with delightful informality, especially if the temperature attains, locally, a critical point which is desperately close to the best working temperature of the bath. Zinc unites with the iron of the kettle, the tools, and the wire; dross falls to the bottom and lies in wait for a chance to corrupt the coating or destroy the kettle.

One way to handle an unsatisfactory process is to abandon it. There are some faint gleams of possibility that galvanizing will one day be improved in this way. The chief value of zinc as a coating lies in its electro-negativity with respect to iron; together they form, in the presence of a corrosive fluid, a galvanic couple in which the zinc sacrifices itself to save the iron. Very few metals stand in this relationship to iron; the only one commercially available is aluminum, whose protective potentiality greatly exceeds that of any other metal, including zinc. Unfortunately aluminum's avidity for oxygen, its high melting point and perfect willingness to eat up a metal container have hitherto baffled all efforts to tame it. But it is a local product, abundant, cheap, light, pleasing in appearance, and develops a protective oxide of satisfactory properties. It is safe to predict that it will be brought under control; in fact as this is written there is a promising development in the early pilot stage.

Present wiredrawing machines are in pretty satisfactory shape; or do we think so merely because they are so new? At any rate the industry is thoroughly committed to the principle of buying rather than building, thus pooling their experience. With their air-cooled blocks, excellent dies and lubrication, and refinements of structural detail, they could run considerably faster were it not for the influence of centrifugal force on the mass of wire on the finishing block. For the sake of subsequent operations heavy bundles are wanted but they cannot be kept at once central enough and low enough to stand high rotative speeds. The solution is to peel off the drawn wire as fast as it comes from the die, depositing it onto some stationary holder. This would solve not only the speed problem but also that of nonstop operation. The thing is not only possible, it has been done already, though not in a construction that ties in well with present continuous machine types.

There is a highly interesting project which can scarcely be called a theory after having been proven mathematically and experimentally, nor a development until timidity of the mill staffs has been dispelled; it is known as reactive drawing. For its comprehension some slight knowledge of die stresses and formulas is desirable.

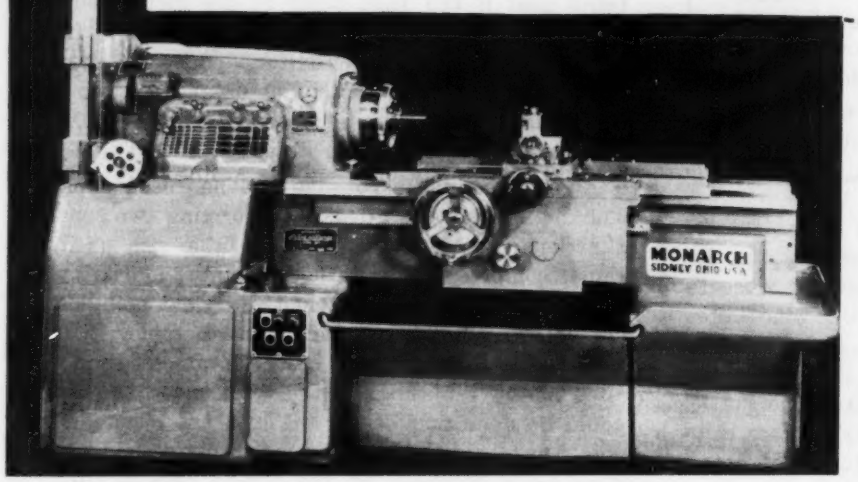
Stress required to deform metal passing through the die is the mean yield point times the area of contact, $A - a/\sin$ (m.y.p.), and the friction load is the same expression times coefficient of friction. It appears that if the yield point of the metal could be lowered the power required to draw it would fall in proportion. This can actually be done by drawing at high temperature, that is, at or above a red heat, a practice which, despite mechanical problems, pays well in the case of certain difficult alloys.

Another course is possible and has been explored. The die must be regarded as performing two separate functions; it holds the wire as in a vise until the radial compressive stress in the cone, induced by the pull on the wire, has reached the yield point of the steel, then when the wire starts to move it determines the size and shape of the product. It is clear that if the stressing of the wire prior to yielding could be done outside the die by some other agency, the power would drop. Such prestressing can be done by a holdback on the strand approaching the die. This prestressing can have no effect on the power required to deform the steel, for whatever is saved at the die will have been spent in the prestressing, but friction is quite another matter. Whatever is saved in the friction factor by stressing outside the die is net saving, and since friction averages about half the total power it will be clear that the target is ample. Theoretically friction could be eliminated, and in laboratory experiments that ideal can almost be attained, but in practice friction can be about halved. If a machine is so designed as to tie the prestressing force into the driving system, which can be done mechanically or electrically, there is a net power saving ranging up to 25 per cent.

Power saving is a small matter, but its implications fan out into more interesting fields. The saving is due directly to a decrease in pressure between die and wire, and the imagination can readily comprehend what this decrease is fairly sure to mean in terms of die life, decrease of coefficient, effectiveness of lubrication, surface finish, drawing speed, and the like. This prestressing technique was devised and disclosed about fifteen years ago. It has attracted much attention among research scholars, particularly in England, where it echoes continually in the technical press, but the principle is revolutionary and the formulas rather complex and obscure. Practical mill people have not yet grasped its implications and lacking a demand, machine designers will not tackle the admittedly complex problem of keying the principle into continuous drawing. It will probably form the basis of our next revolution, but it is by no means certain that those who pioneered in it will survive to enjoy their triumph.

MACHINABILITY OF FREE-CUTTING STEELS

Measured by New "Yardstick"



Method requires short testing time, providing adequate reproducibility of test ratings that give machinability indices that agree closely with tool life values and large-scale commercial machining operations

Fig. 1—Overall view of machinability-testing lathe specially equipped for accurately and quickly measuring machinability of free-cutting steels

STEEL distributors and customers have long sought a simple, fast, dependable means of predetermining, from representative small samples of an entire production lot, the turning qualities of free-cutting steels—a laboratory-testing "yardstick" by which probable performance of bar stock in commercial machining operations could be measured with a reasonable degree of repetitive accuracy.

As steel distributors view it, such a yardstick would aid materially in meeting more closely steel and alloy specifications of their customers.

That this quest for a simplified, short-time method to measure and rate the machinability of free-cutting steels has proved a difficult one is reflected by the various laboratory tests which have been devised in approaching the problem. Practically all have involved the arbitrary selection and holding constant of one or more of a number of factors such as the machining operation itself, cutting fluids (if used), tool shapes and tool materials.

Usually, these have been evaluated by determining and measuring some other important allied variable, which it is believed, is related closely to cutting quality. Production variables have included such considerations as rate or quantity of metal removed, tool wear or life, chip behavior, pressures, and measurements of tool and work temperatures—the amount of heat generated in cutting operations.

Important as these machinability tests and their indices have been in contributing to the development and continued improvement of free-machining steels, the very complexity of such test methods restricted their utilization to the best-equipped laboratories and machine shops.

Simplifying and speeding-up machinability testing of free-cutting steels has, therefore, been directed toward a number of objectives:

A shorter testing period, sensitivity to a high degree, ability to reproduce test results at all times, and machinability ratings which would correspond closely to values already established by conventional laboratory tool-life tests and large scale commercial machining operations.

The New Test—Now, to the laboratory machinability tests frequently employed as criteria for measuring the complex and elusive property of machinability, may be added another type—one that gives every indication of meeting these objectives. It is the "constant-pressure lathe test", which makes practical the selection of a bar of stock and determination from it of the probable machinability for the entire lot.

The method, based on the use of a Monarch lathe specially equipped to provide fixed tool pressures with a constant component in the horizontal direction, was first made known last summer following its development in the course of a co-operative research project conducted at the Battelle Memorial Institute, Columbus, O., under sponsorship of Carnegie-Illinois Steel Corp.

Since steels embraced by this particular study were types ordinarily machined in automatic-screw-machine operations, machinability ratings based on lathe tests appeared feasible. Also to be investigated was the cause—or causes—of variations in cutting qualities between steels of presumably the same grade.

In view of these and other considerations, a testing method was called for that would prove sufficiently sensitive to small differences in machinability, give reliable and reproducible ratings, require minimum time, material, and labor, and allow comparisons, on the same scale, of specimens of different sizes and widely different compositions.

Test method utilized was based

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upon the finding that when a horizontal pressure of fixed value is applied to the feed mechanism of the lathe, and consequently to the cutting tool, steels of different machining quality cut at different rates. Machinability ratings based upon the close relation of these feed variations were secured on different steels under controlled laboratory test conditions.

Data Very Encouraging—Although data accumulated are not regarded as conclusive, they are of sufficient scope to indicate that this constitutes a valid method of measuring the machinability or turning quality of free-cutting steels in terms of reliable, reproducible ratings. Briefly, the method may be said to:

(1) Provide a high order of sensitivity.
(2) Provide adequate reproducibility of constant - tool - pressure machinability test ratings in comparatively close agreement with tool-life test values when sampling is reliable.
(3) Disclose differences in cutting quality between samples of the same grade of free-cutting steel.
(4) Provide machinability indices which are in agreement with ratings obtained by conventional laboratory tool-life tests and large-scale commercial machining tests.
(5) Offer a relatively quick, dependable means of rating the cutting qualities of free-cutting steels with the use of small samples, providing an indication of the probable performance of these materials in commercial machining operations.

Comparatively simple, the lathe used for the machinability-testing, differs from a standard machine in three particulars. First, the tool carriage is disconnected from the fixed-feed mechanism and is mounted on antifriction bearings to move easily along the bed. Secondly, the lathe is designed to apply a predetermined horizontal tool pressure. Thirdly, a mechanical counter records the number of spindle revolutions and measures tool travel.

Powered by a 5-horsepower motor and providing 16 spindle speeds ranging from 24 to 1000 revolutions per minute this lathe has a 16½-inch swing and 30 inches between centers. The spindle, bored out, accommodates bars up to 1.5 inches in diameter. As Fig. 1 indicates, all of the mechanism common to a standard lathe is removed from the apron except the handwheel and rack pinion —not even the oil pump is left in! The carriage is also equipped with metal shields to prevent chips from falling on the ways of the unit and collecting under the ball bearings on which the carriage is mounted.

Behind the handwheel is a drum, Fig. 2, around which piano wire of 0.031-inch diameter is wound, then carried across three different pulleys, arranged as shown in Fig. 1. Weights are suspended from the third pulley. This weighted wire, passing across where the gearbox would be in a conventional lathe, pulls the carriage into the work.

Weights Determine Travel—Rate of carriage travel depends not only upon amount of weight used, but also upon resistance of the steel test piece to cutting and the chip friction encountered as the work moves over the tool. By adding or subtracting weights from the wire, the horizontal feed of the carriage can be increased or decreased. Travel of the weights from the floor to the top pulley gives a range of 7 inches to the carriage.

The solid-block toolholder is rigidly fastened to the compound, and is specially designed to hold the tool so that its edge forms a right angle with the direction of tool travel and the axis of the steel bar undergoing test. See Fig. 3. Clamp bolts hold the tool, pressing it against a wedge which rests against the tapered groove bottom.

As a result of this taper and wedge, the tool may be adjusted quickly, thereby putting the cutting edge at the same height as the center line of the test bar. Tool bit is ¾-inch square high-speed steel. Angles on the tool are 12 degrees for rake and side clearance. Mounted directly back of the toolholder, a dial-gage fixture measures the distance from the top of the tool post to the cutting edge of the tool. This tool position is constant for all tests.

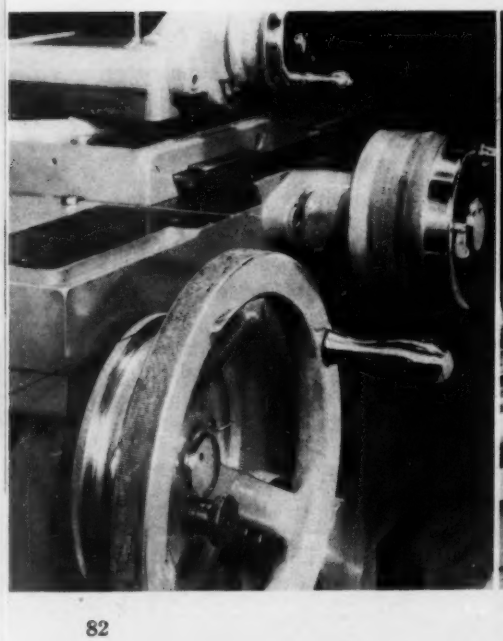
Eighty-Pound Pressure Used—Sample of bar stock to be tested is mounted in a collet chuck. In general testing practice the check is made on a ⅞-inch diameter piece, using the following procedure:

The tool is first set for a cut ⅛-inch deep, and about 6 pounds of weight loaded on the piano wire. With pulleys and levers providing a mechanical ratio of 13.2:1, a tool pressure of approximately 80 pounds is obtained.

The spindle of the lathe is run at 377 revolutions per minute. As the tool advances, four pins in the first pulley (mounted at bottom of column at left of machine) activate a switch, closing an electrical circuit

Fig. 2 (left)—Cable and pulley of the machinability-test lathe connect feed load to handwheel. Feed load is transmitted to carriage by gear and pinion which move along lathe rack

Fig. 3 (below)—Closeup of special toolholder which permits adjustment of tool by taper and wedge so cutting edge forms right angle with axis of test piece and direction of tool travel



Typical photographs showing stocks of Hot Rolled bars and structurals in the expanded facilities made possible by the new buy.

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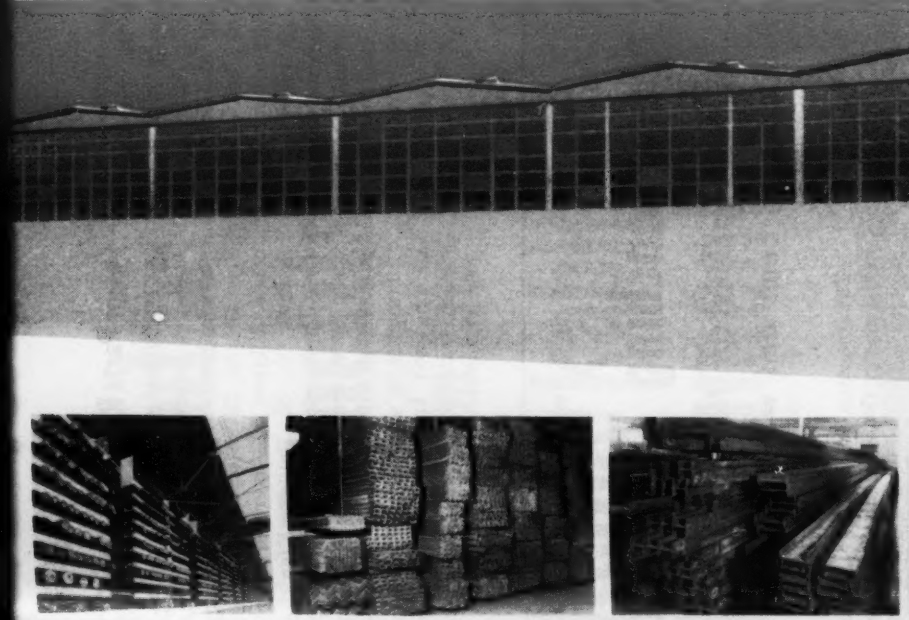

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at each 0.2-inch increment of tool travel. When this occurs, a signal bell rings. Driven by roller chain and sprockets connected to the lathe spindle, a mechanical counter installed on the left of the headstock records the number of spindle revolutions. It is geared to indicate every second revolution.

Combination of these two measuring devices provides an accurate figure for the amount of metal removed. Standard test norm is 377 rpms at 81 pounds tool pressure and 0.003-inch of feed per revolution. As greater or less weight is applied to increase or decrease the pressure, a corresponding change in the machinability index is found. Usual practice calls for making about 10 test runs on each batch of steel.

Determination of the machinability of a piece of steel is important to the user. So far as free-cutting steels are concerned, the yardstick of machinability afforded by the method briefly reviewed here undoubtedly will attract more attention as its advantages become more widely known in the industry.

Fewer Parts Reduce Maintenance

THROUGH the elimination of thousands of pounds of wearing parts, maintenance costs are reduced on the new 25 ton DiesElectric locomotive crane designed by American Hoist & Derrick Co., St. Paul 1, Minn. All deck operations of the model 825 DE crane are accomplished by diesel power, direct from the engine.

Travel is by electric motors mounted on each truck. A direct connected traction type generator supplies the current.

Heating and Quenching Time Cut

. . . by new machine for flame hardening gears, cams and wheels

NEW principle for flame hardening gears, cams and wheels is employed in a machine recently developed by Lakeside Steel Improvement Co., Cleveland. Costs, as against previous methods of case hardening the wearing surface only, are reported to have been reduced, and control of case depth brought to a peak of uniformity.

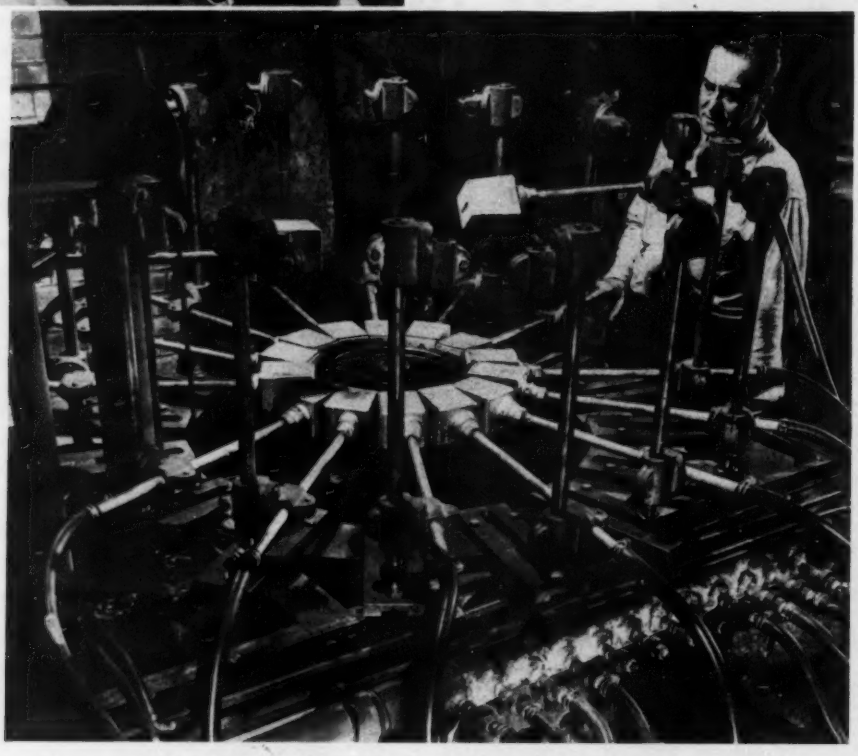

Fig. 1 (top)—Work, still rotating on the spindle, is submerged in the quench tank

Fig. 2 (bottom)—Machine with workpiece in position for heating. Number of burners directed on the piece can be increased or decreased

The machine, called the Lakeside radial rotary flame hardener, consists of a series of patented burners, Fig. 2, directed on the piece, which is mounted in a motor-driven spindle. Work spins at a determined rate of speed as it heats. As soon as the proper temperature is reached, the hydraulic mechanism quenches the spinning work in a tank of water or oil, Fig. 1.

With this arrangement, time of heating and quenching is cut considerably, and hardness of the material is increased to the maximum. Special patented burners fit the contour of the workpiece. Number of burners directed on the piece can be increased or decreased.

Time of heating and quenching depends entirely on the size of the work. The present machine accommodates work up to 36 inches in diameter with a 4 to 5-inch face. An ordinary size gear is heated and quenched in 10 to 12 minutes. On thin face of any size up to 18 inches in diameter, hardening and quenching can be done in multiples by stacking one upon the other. Most successful results have been obtained from steels of 40 to 50 carbon such as 1045, 4140, 1345 and similar grades.

The machine is owned exclusively by Lakeside. According to the company's president, C. W. Derhammer, plans do not call for the production and marketing of the product by Lakeside itself. Several proposals for manufacture and sale of the new machine are under consideration at this time, but no final plans have been made.

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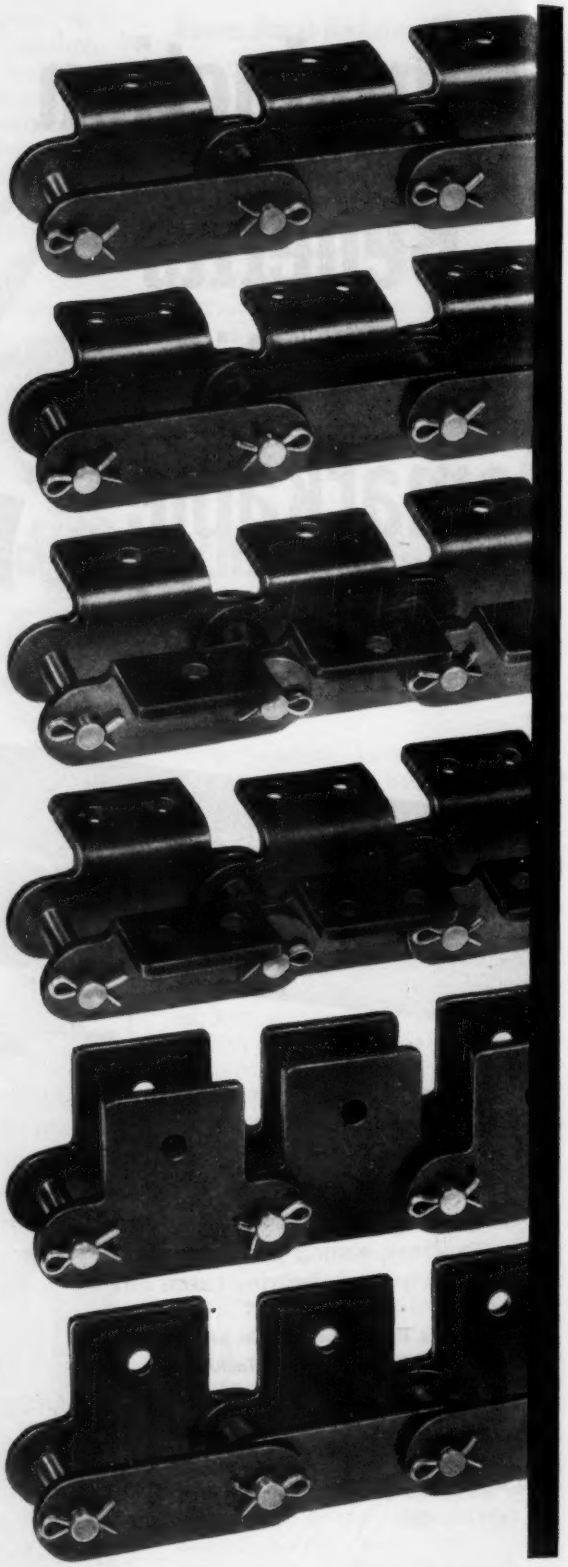

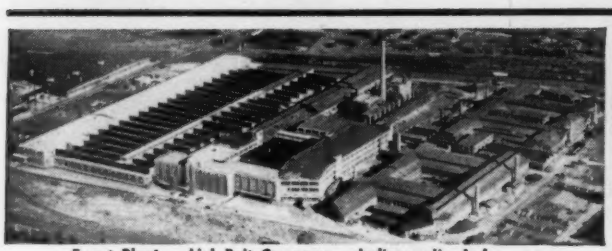

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ONE OF the most recent additions to Westinghouse Electric Corp.'s Standard Control Division, is the modern and up-to-date plating department. Not only does this section of the Beaver, Pa., plant, contain the most recent types of equipment, but boasts such safety features as improved methods of air draft and air circulation, safety showers, nonskid floor tile, modern sewage and waste disposal and other such factors that make for safe and efficient production.

Some of the most recent types of plating equipment are included in the installation, such as new designs in transfer and handling equipment, tank linings, power supply and automatic equipment. An example is the Stevens automatic plating equipment which can produce thousands of plated articles per day, but which requires only one operator to load and unload. Each barrel of the automatic unit advances to the next tank automatically at a predetermined time (average about 8 minutes). Twenty-seven plating barrels are continually traveling and rotating through the soak tank, electroclean tank, water rinse, acid tank, water rinse, cyanide dip, cadmium tank, tin tank, rinses and finally a drying cycle.

Generally, the functions of plating are two-fold: (1) To produce a durable product that is resistant to corrosion, and (2) to provide articles that are pleasing in appearance. A third function that might also be considered in the manufacture of electrical products is plating to increase the electrical efficiency of certain items, as effected through silver and copper plating.

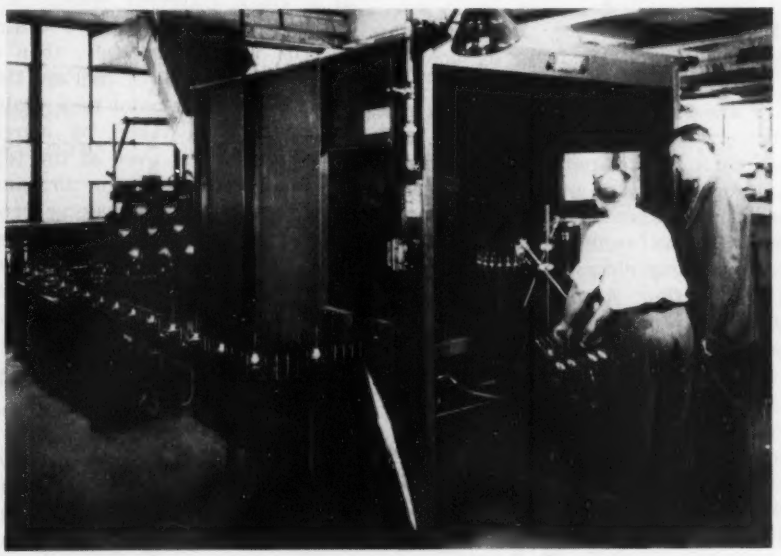
Semiautomatic Application—Silver, nickel, tin and copper finishes are applied semiautomatically in rotating barrels that are manually moved from the cleaning tanks to the plating barrels. Only small and compact items that tumble easily can be plated in barrels. Larger and bulkier items are racked and plated in still tanks. Other activities carried on in this department are polishing, pickling, paint stripping, degreasing, bright-dipping, oxidizing, chemical tinning, silver strike, copper strike, and nickel strike. In addition to plating for production purposes, such items as small tools and dies are chrome-plated to increase their efficiency and to reduce costs.

All process baths are operated according to rigid specifications that produce maximum efficiency, economy and the highest quality of plate. Maintenance of all plating solutions is closely controlled through frequent periodic chemical analysis, chemical additions, filtrations, and other operations that insure a good plating solution. Quality of the plate is maintained through continuous chemical and physical tests. Plating specifications are strictly adhered to in order to secure maximum performance and to control the type and thickness of plate.

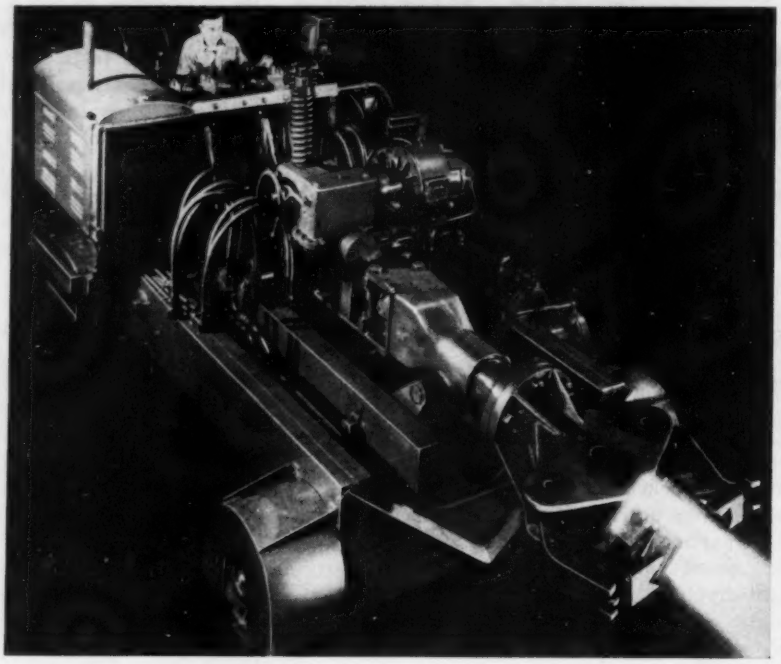
Tumbling and Deburring—The deburring department is located near the heat treating and plating department because many of the parts receive heat treating and plating operations before or after the deburring operation. Before proper finishes can be applied, it is necessary that pieces be free of burrs and surface imperfections. Parts of irregular shape are being successfully deburred and polished that would not have been attempted before. The difference is the result of controlling all factors connected with the operation and the introduction of sized abrasive chips.

Where formerly only the length of time in a barrel was controlled, consideration is now given to the ratio of work parts to abrasive, type and size of abrasive, speed of barrel, load height, compound and amount of water. Use of stone and aluminum oxide chips makes possible the processing of odd shaped parts, much shorter cycles, and the removal of more material.

Benefits obtained in both new and old processes include: (1) Uniformity,



TO SPRAY OR NOT TO SPRAY: Equipped to run tests on actual products, using standard automatic and manual spray finishing equipment, is the new finishing methods research department set up by Binks Mfg. Co., Chicago. Purpose is to determine whether or not the products can be finished automatically, and if so, show the production and cost which can be expected. Shown is an automatic spindle machine for finishing round, cylindrical or irregularly shaped objects. Product to be finished is mounted on conveyor spindles which rotate in front of spray guns



33,000-POUND GIANT: Capacity to handle a 10,000-pound bloom or forging blank in its continuously rotating jaws is claimed for this 33,000-pound Auto-Floor manipulator built by Edgar E. Brosius Co. Inc., Pittsburgh, for the Nazionale Cogne steel plant in Torino, Italy. Because of its size it required special permission to transport it over the highways in two states. Self-propelled and able to turn on its own wheelbase, the machine has the following hydraulically actuated functions: 2-foot lateral movement of peel, raising and lowering of peel in horizontal position, tilting the front or rear of peel independently, tongs grip and continuous rotation of the tongs

(2) close tolerance control, and (3) low equipment cost.

Bonderizing—In the Bonderizing department, work is hung by hooks to bars on a continuous conveyor. Bars are picked up and deposited in a battery of five tanks, remaining in each tank approximately 60 seconds. No. 1 tank contains an alkaline water conditioning agent, used in combination with an emulsion cleaner for pressure spray cleaning of steel prior to Bonderizing. All solutions in the tanks are applied by spray at 15 pounds pressure.

No. 2 tank is a hot water rinse maintained at 150° F. Water is kept overflowing continuously to keep the tank free of scum. The Bonderizing operation takes place in the No. 3 tank. Temperature is maintained at 155° F ± 5°. No. 4 tank contains unheated water rinse. No. 5 tank contains a chromic acid rinse. This serves as a fixer for the Bonderite coating.

After leaving the tanks, the bar is picked up by a conveyor transfer arm and deposited on an upright stationary column where it remains for drainage purposes for approximately 1 minute. The bar is then picked up by a conveyor transfer arm and set on a chain conveyor which carries the bar over a blast of hot air to dry the work completely, then carries it over a blast of cool air before submersion in the paint tank. Painted items are then taken by conveyor through a baking oven at the top of the Bonderizer, requiring 35 minutes to pass through the baking process at a temperature of 300° F. The work then passes overhead to an unloading area. Total time for this cycle is 1 hour and 35 minutes.

Hypergeometric Function Tables

A BASIS for more efficient use of analysis-of-variance tests than has heretofore been possible is provided by extensive tables of the confluent hypergeometric function and related functions, offered by National Bureau of Standards, Washington, 25, D. C. Analysis-of-variance is a statistical technique having important applications in industry and agriculture, where frequently it is desirable to determine whether differences in manufacturing processes effect the mean level of performance.

Tables published in the 73-page booklet are also of value in the construction of the sequential t-test, tables for which will be issued in a forthcoming publication of the applied mathematics series. Sequential analysis is a newly developed tool of statistical sampling.

Electrodeposited Coating Tests

ALL of the standard specifications and test methods pertaining to electrodeposited metallic coatings on metals are available in a publication sponsored jointly by American Society for Testing Materials and American Electroplaters' Society. In the 1949 compilation are specifications for various types of electrodeposited coatings on steel, including zinc, cadmium, nickel, chromium and lead.

There are specifications for coatings of nickel and chromium on copper and copper-base alloys and on zinc of zinc base alloys; also a specification which covers chromate finishes on electrodeposited zinc, hot-dipped galvanized and zinc die-cast surfaces. Two test methods are given —one for local thickness and the other salt spray testing. Publication is available from the ASTE, 1916 Race St., Philadelphia 3, Pa.

Industrial Rail Safety Booklet

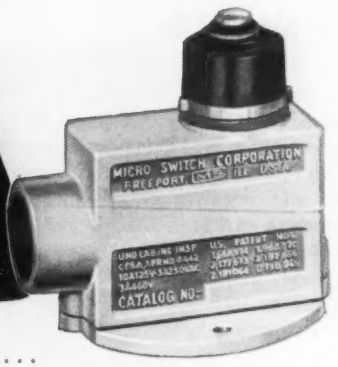
BASED on practical experience of railroad men is a 50-page safety training booklet published for use of rail transportation employees of Middletown Division, Armco Steel Corp., Middletown, O. Containing many pictures and written for easy reading, the booklet gives train crews detailed and illustrated instruction on the correct way to perform virtually all of their train-handling duties.

Electrode Has Extra Length

WELDS made with a new cast iron electrode of All-State Welding Alloys Co. Inc., 273 Ferris Ave., White Plains, N. Y., are ductile and 100 per cent machinable, even at the bond. Core is more than 99 per cent nickel and an extra inch in the 15-inch length proportionately decreases stub losses. Electrode is intended for alternating or direct current, straight or reverse polarity when used at amperages ranging from 40 to 180, depending upon diameter.

According to the company, it may be used for the general welding of cast iron wherever free machinability and color match are required. Tensile strength is said to be 30,000 to 50,000 psi. Carrying No. 8 identification, it has the following advantages: Smooth deposit with little spatter; easily removed flux residue; cold welds; no fumes; use in all positions; and all types of joints. It is also said to avoid cracking and distortion.

MICRO PRECISION SWITCHES for Production Short Cuts

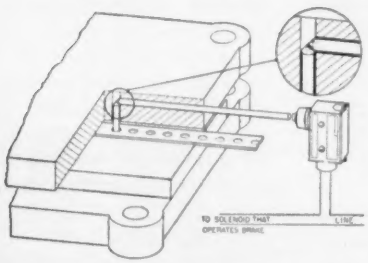


MICRO . . .
first name in precision switches

There are unlimited uses for MICRO precision switches in every plant. MICRO products are provided with housings and mountings to meet every type of industrial need. They may be actuated by cams, dogs, slides or other actuation.

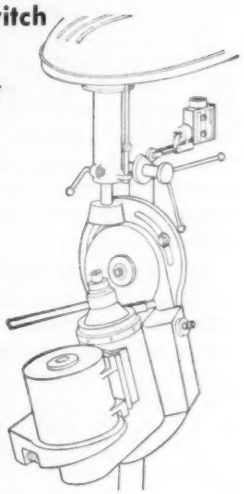
Below are shown a few ways in which plant engineers are using MICRO precision switches to make equipment more automatic and reduce production costs. "MICRO TIPS," published regularly, offers ideas on many production short cuts. Available on request.

1 MICRO Precision Switch used as safety on progressive die



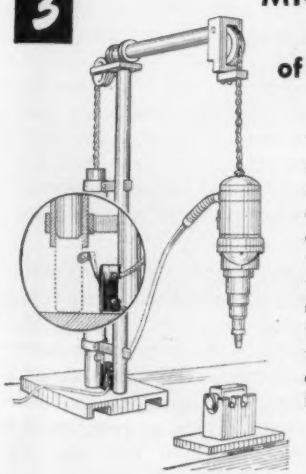
A miscut cannot damage this die. If stock is not fed close enough for pilot punch to pick it up, a rod operates the MICRO die cast enclosed switch. This closes the solenoid brake circuit and stops the press. It is operating on presses with 1" to 3" stroke at 130 strokes per minute.

2 MICRO Precision Switch operates to brake motor shaft automatically



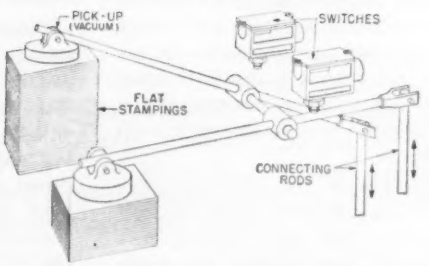
Loading and unloading of this lens grinder is speeded up by this device which decelerates the spindle from 600 rpm to 0 in two seconds. Pulling down the quill operating lever trips the MICRO precision switch. This energizes the solenoid which releases the brake. Returning the lever to the starting position de-energizes the solenoid, allowing spring pressure to force the brake shoe against a small drum on the motor shaft. Result is higher production and greater safety for the operator.

3 MICRO Precision Switch controls operation of Electric Screw Driver



The counterbalance of the driver depresses the roller leaf actuator of a MICRO precision switch. This opens the circuit and shuts off the motor when the screw driver is elevated on the pulley. When the screw driver is pulled down toward the work, the balance weight is lifted (see insert), closing the circuit and starting the motor.

4 MICRO Precision Switch signals when stamping supplies are low



This device indicates when but 35 stamping blanks are left in the clip of this assembly machine. When the supply is low, the MICRO precision switch is actuated and closes circuit to sound buzzer and flash a light. Four such loading arrangements are used on an assembly machine.

MICRO SWITCH Distributors with complete stocks are located in ninety cities to supply you with just the right switch to make your plant operations more automatic. Look them up under "Switches, Electric" in your local classified phone book or write:

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MICRO MS SWITCH
A DIVISION OF FIRST INDUSTRIAL CORPORATION
FREEPORT, ILLINOIS, U.S.A.

BRANCH OFFICES: Chicago • New York • Boston
Cleveland • Los Angeles

SALES REPRESENTATIVES: Portland • St. Louis
Dallas • Toronto

Longer Motor Life

(*Continued from Page 60*)

that might give rise to oxidation and corrosive reaction, or to decomposition or settling is also objectionable. Such a grease should contain a highly refined oily constituent having high resistance to oxidation. This oil should be combined with carefully selected, high-grade soaps. Inhibitors usually are added to improve further the resistance to oxidation.

Mechanically the grease should be easy to apply, have low starting and running torques, be adhesive (not throw off), withstand heat, be highly stable and resistant to leakage. When very high temperature service is involved up to around 350° F the grease should be specially prepared to function under heat conditions.

Normally, a grease-lubricated ball bearing should not be filled more than half full. This means the pressure guns should be carefully handled for at best the amount can only be estimated, unless the bearing is hand packed. Too much grease can cause over-heating and leakage past the seals.

Effect of High Temperature—Effect of high temperature on certain sealing materials involves deterioration. The effect of high temperature on lubrication is to reduce the viscosity or consistency of any lubricant. Extent to which this will occur depends, of course, upon the original body of the product.

Unless the latter is of the nature of a steam cylinder oil and possessed of adequate viscosity, at steel mill temperatures considerable leakage may result from certain types of bearings. For this reason, steam cylinder stocks are used in certain grades of high temperature ball and roller bearing greases. A lubricant of this nature, along with a suitable bearing seal, will keep down leakage to a marked degree even under very high temperatures.

Vertical motor installations have called for considerable study of sealing devices. The ball bearing has proved to be particularly adaptable to such motors, due to it dependability under high speeds and intensive thrust loads. When such motors are designed for oil lubrication, cups are connected through ducts to the bearing housings. Oil level in the system should be kept well up to assure of thorough lubrication. This is a phase of splash oiling.

A bearing seal must not only seal, but also it must show practically no wear in service; otherwise, the purpose may be more or less defeated. Washer type seals may consequently be unsatisfactory, although the rate of wear will depend upon the quality of the material. Adjusting springs can be used in connection with washer or leather cup seals in order to keep the material in close contact with the shaft or journal surface. This will compensate for wear and enable the bearing to retain its lubricant more dependably.

Grease Groove Seals — Grease groove seals are used to prevent leakage of lighter lubricants. They are also relatively simple and inexpensive to design. They must be periodically examined, however, in case the sealing grease requires renewal. Otherwise possible glazing of the surface of the latter where it comes in contact with the rotating shaft might result in sufficient clearance to allow leakage of the bearing lubricant.

Very heavy bodied greases of high melting point are adaptable to service as grease seals, provided they show no tendency to separate oil from soap, and contain no material which might be abrasive to the shaft surface. Grease grooves can also be used together with felt washers in certain types of service, although this may require extension of the length of the bearing housing.

In any piece of electric power generating or transmission machinery, the insulation must be in good condition if the machine is to operate properly. Lubrication, especially overlubrication, can affect motor life because it can cause oil-soaked insulation. Oil travel along the shaft from an over-lubricated bearing also may carry dirt or dust accumulations to the windings. All this can result in higher operating temperatures. Too much heat and the softening solvent effect causes oil soaked windings to deteriorate rapidly.

Cleaning and Flushing—Cleaning and flushing is an important procedure in motor bearing maintenance. The frequency of such a procedure will be governed by the type of bearing and conditions to which it is exposed. Ring or chain oilers on sleeve-type bearings automatically flush themselves to settle any foreign matter in the reservoir below the bearing. Wick oilers or other methods of periodic lubrication are not so effective here. If foreign matter can get in, it stays until the bearing assembly is flushed and cleaned. The same holds true for the grease-lubricated ball or roller bearings.

It is especially important to keep abrasive contaminants out of ball or roller bearing greases as churning of abrasive foreign matter with the grease, between moving parts, which are precision-built to clearances of only a few ten-thousandths of an inch, will cause serious damage to the bearing elements. For this reason, specialty greases for ball and roller bearings are prepared from carefully selected and filtered ingredients, and even later filtered by some ball bearing manufacturers, if they are to be used in prelubricated, sealed-type precision bearings. In service, the seal should be so effective as to keep such lubricants in this high state of purity.

To set any hard and fast rule, even with the best of seals, is unwise, however, due to the wide variety of service to which motors must be subjected, particularly in industrial or power plants. The extent to which dust, dirt, metallic chips or scale may be present in the air or be drawn into any bearing will, of course, be an influencing factor.

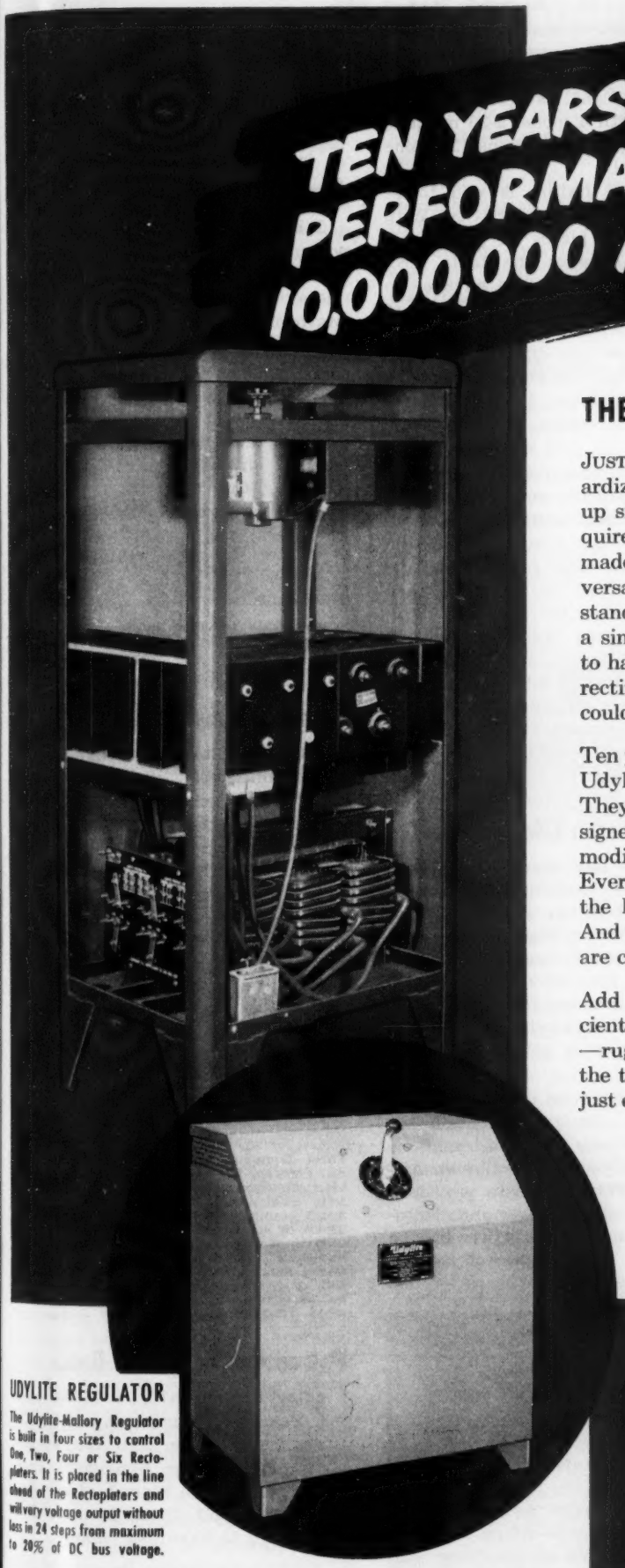
Oil-lubricated bearings can be drained if an outlet is located in the base or lower part which can be tightly plugged in service; this will prevent leakage during operation. Sometimes this can be elaborated upon by an arrangement of nipples and pipe fittings terminating in a sight gage glass. This facilitates not only cleaning, but also observation of the oil level in the bearing. Oil lubricated sleeve-type bearings should be gaged regularly for oil level in reservoirs, and only enough oil should be added to bring the level to the proper height.

Cleaning Procedure — Sleeve-type motor bearings will often require more frequent cleaning than ball or roller bearings, as their housings cannot always be so tightly built. With the former, cleaning may be necessary or advisable at periods ranging from every two weeks to several months according to the extent of dust or dirt in the surroundings, whereas a properly housed ball or roller bearing may function much longer under the same conditions. On the other hand, such bearings are more delicate from the viewpoint of construction, and therefore, the lubricant should not be allowed to become so contaminated as to cause abrasion, rough running and noise.

Wherever grease lubricated ball or roller bearings are involved and drainage cannot be readily carried out, due perhaps to the body or consistency of the lubricant, the grease should be wiped out thoroughly at the period of cleaning. It is also practicable to flush some types of ball and roller bearings with hot oil. Such bearings can be all the more completely cleared of used grease if the drain plug is removed when new grease is applied, as it is when flushing.

Ring-oiling systems possess natural advantages in that the flood of oil which is constantly passing through the bearings tends to wash out any grit, dirt, dust or metallic particles

TEN YEARS OF TOP PERFORMANCE . . . 10,000,000 AMPERES



UDYLITE REGULATOR

The Udylite-Mallory Regulator is built in four sizes to control One, Two, Four or Six Rectoplaters. It is placed in the line ahead of the Rectoplaters and will vary voltage output without loss in 24 steps from maximum to 20% of DC bus voltage.

THE UDYLITE-MALLORY RECTOPLATER

JUST TEN YEARS AGO, Udylite pioneered the first standardized rectifier, a self-contained unit that could be set up singly or in multiple to meet varied amperage requirements. This—the first standardized rectifier ever made—was a major step toward more economical and versatile plating shop equipment. For the first time a standardized unit was available which could be used as a single unit or could be installed in a series of units to handle practically all plating jobs. Up till then shop rectifiers were expensive custom-built models which could be used for only one type of operation.

Ten years later with over 7,000 sold, these standardized Udylite-Mallory Rectoplaters are still in production. They have been so soundly engineered, so efficiently designed that it has been necessary to make only minor modifications during the entire decade of production. Every Udylite-Mallory Rectoplater built has embodied the high standards of Udylite-made equipment . . . And vital parts of each unit—transformer and bridges—are completely interchangeable.

Add up this outstanding record of dependability—efficient, modern design—easy interchangeability of parts—rugged Udylite construction—and you'll find that the total means real plating shop performance. This is just one of the many developments in the plating industry which Udylite has pioneered. Your nationwide Udylite Technical Team will gladly show you many ways where Udylite can assist you in solving your plating problems. Write The Udylite Corporation, Detroit 11, Michigan. Offices in principal cities.

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

MOTOR GENERATOR SETS ★ SWITCHES ★ RECTOPLATERS ★ RHEOSTATS ★ PLATING SUPPLIES ★ FULL AND SEMI-AUTOMATIC PLATING EQUIPMENT ★ TANKS & TANK LININGS ★ PLATING BARRELS ★ AUTOMATIC POLISHING AND BUFFING MACHINES

that may have gained entry. As a result, wear is reduced to a minimum, just as long as the oil in the system does not become so highly contaminated as to be unable to precipitate such foreign matter during its period of so-called rest. The washing action in a flood lubricated bearing naturally causes gradual accumulation of foreign matter. Therefore, the condition of the oil should be carefully watched, and the system drained when any excess of dirt becomes apparent.

A flushing oil wash (using an automotive type crankcase flushing oil heated to around 140° F) will normally take up and remove such material. In an installation which has been subjected to severe service, neglected or filled with an unsuitable gum-forming lubricating oil, a petroleum solvent may be required.

Standardization of Gear Cutters

(*Concluded from Page* 62)

shaving. Three factors have given it a key position on the production line: Ease of setup which permits rapid change-over from one gear to another, these switches being made from three to four times a day; longer tool life; and shorter cycle time in some cases. An average of 110 to 120 gears per hour are turned out on this machine.

Cutter Life Long—Tool life is difficult to estimate inasmuch as jobs are changed so often and since more than one gear type is shaved with most cutters. On a 17-tooth, 1½-inch face spur gear, Canadian Acme estimated cutter life to be about 5000 gears per grind. Using the same cutter to shave a 43-tooth, ⅝-inch face gear would increase this to 15,000 gears per grind.

Gears with the fewest number of teeth are almost always shaved with the sharpest cutters, as these gears are usually more critical as to noise. Spot involute checks of the finished gears indicate when the cutter should be transferred to the shaving of less critical gears. After each setup, the first gear off the shaver is run with a master in a gear speeder. Marking compound on the master locates any contact errors requiring correction of setup. After 2 hours running time, a second check is made and the shaver readjusted if necessary.

Fixture Key to Productivity

INTRODUCTION of a horizontal milling machine with special tooling and mechanism has made a production item out of the cutters for oil well drills. Milling of these cutters was difficult as they are machined from forgings of high nickel and molybdenum content. Formerly it was an entire hand-operated machine tool job, and later a semiautomatic operation, but now Globe Oil Tool Co., Los Nietos, Calif., is performing the operation with a model 2-20 machine developed by Kent-Owens Machine Co., Toledo, O.

The special fixture is said to be the secret of the productivity. With it the operator places the part in position and engages the table feed. The table makes a rapid advance to the milling cutter, the quill feeds to the proper depth and the table automatically goes into direct feed. After advancing the proper distance to completely mill one tooth, the table reverses and returns to the starting position.

At the starting position, the fixture automatically indexes and the cycle is repeated until the last tooth is milled. With completion of the last tooth, the table reverses and the quill withdraws. The machine then comes to a stop for unloading. Fixture is designed with hydraulically controlled automatic indexing and reportedly is easily adjusted to mill either straight or spiral teeth. Only operation necessary to change the number of teeth milled at a setting is to change the index plate.

Hammer Piston Life Increased

PISTON life has been increased 12.3 times by the hard-surfacing Iramet process used in the manufacture of controlled power chipping hammers made by Ingersoll-Rand Co., Phillipsburg, N. J. Line offered has 15 power sizes in five basic hammer sizes, each of the latter being available in normal cut, extra cut or super cut type.

Amount of air fed to the front and rear of the piston to maintain top cutting efficiency under all conditions is accurately proportioned by an Airite valve. This is said to provide a smooth flow of full power and eliminate short stroking and power loss on heavy cuts. Three types of handles are available.

Expanding Furnace Is Portable

VERMICULITE, a type of mica which expands 15 times its volume when subjected to intense heat during processing, may be expanded in a new small portable furnace, developed by Zonolite Co., Chicago. Weighing 8000 pounds the furnace is skid-mounted and may be set up in almost any building without requiring special ore pits or foundations. It is shipped in four parts and may be assembled and put in operation within 8 hours.

LETTERS *to the Editors*

Marform Again

I have noticed with keen interest your article in the issue of Sept. 26, 1949, page 100, regarding a new sheet metal forming method known as Marform, developed by Glenn L. Martin Co. of Baltimore. As we are fabricators of aluminum and many of our runs are considered short runs, I feel that this new process may be of some advantage to us. I would appreciate any help you can give me in securing the technical information and data regarding this Marform method.

Sam Harrison
Leumas Ware Corp.
Bronx, N. Y.

Very little technical information has been released on the process to date. We suggest that you contact the company, Baltimore 3, Md.—The Editors

Farm Implement Disks

I am interested in the manufacture of seed-disks, plow-disks and in general disks used in agricultural implements. I would like to know: Names of companies making such disks in the U. S. A. and in which plants; procedure that is used to make these disks and with what heat treatment; the dimensions of the most commonly used disks; the name of the institute connected with this type of product; and do you know of any technical paper published on the subject?

Etienne Spire
Consulting Engineer
Montreal, Canada.

Most of the questions can be answered by Farm Equipment Institute, 608 S. Dearborn St., Chicago, Ill. As a research unit, it probably can furnish technical papers on the subjects mentioned. Most companies use either heavy stamping and forming or forging operations in making these disks. Heat treatment used involves either induction heating or flame hardening. However, some of the larger companies making them on a production basis resort to automatic heat treating furnaces. A list of companies making these disks is being sent.—The Editors.

Pat on Our Collective Backs

After reading STEEL's Metalworking Yearbook, I must say it is the finest issue I have seen and worthy of a place in our permanent files. Have you made a reprint of the statistical section? If so, I would like very much to have two copies.

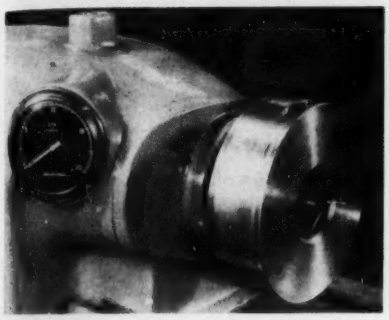
L. O. Millard
Assistant General Sales Manager
Link-Belt Co.
Chicago, Ill.

Reprints of this section are available and copies have been forwarded.—The Editors

New Products and Equipment

Automatic Work Driver

An automatic work driver of the serrated jaw type is announced by Monarch Machine Tool Co., Sidney, O. It is applicable to series 60 engine and toolmaker's lathes for production operations such as those utilizing Air-Gage Tracer and Motor-Trace controls, Mona-Matic lathes, for high



production between-center work and Uni-Matic lathes, when arranged for high production between-center work. These lathes have a 6-inch type D-1 spindle nose or a 6-inch type A-1 spindle nose.

Accessory is for between-center operations of all types where marking of the driving surface is permissible. When spindle is started, a lever arm actuated jaw clamps the work so that the heavier the cut, the harder the driver pulls. If spindle is stopped quickly, the driver opens automatically. It is supplied with two sets of standard jaws, one with capacity from 1 to 2¼ inches, the other of from 2¼ to 3½ inches. A third set with a capacity of from ½ to 1¼ inches is available. Interchangeable jaws are of the floating type, compensating for a reasonable amount of eccentricity.

Check No. 1 on Reply Card for more Details

Horizontal Line Index Machine

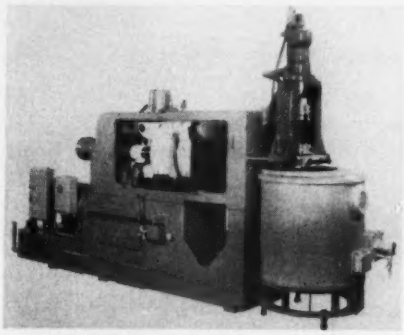
Accurate drilling, reaming and tapping of holes in crankcases is attained with a two-way horizontal line index machine built by Snyder Tool & Engineering Co., Detroit, Mich. It is equipped with two standard hydraulic units carrying the multiple spindle heads for drilling and other operations. Two Snyder standard lead screw tapping units are mounted at the rear of the machine. Tapping unit for flywheel end of part has 25 lead screw spindles.

One of the tapping spindles in this head is used in a separate platen to tap the oil galley hole and an 11-lead screw spindle is required for the opposite end. High speed steel tools are used. The operation of drilling, reaming and tapping a total of 53 holes takes 3 minutes, plus loading and unloading time. Work holding fixture is mounted on a hydraulically actuated slide which moves the part through four work stations and back to load and unload station. Power is supplied by two 15, one 7½, one 5 and one 2 hp motors. Machine is electrically interlocked for safety.

Check No. 2 on Reply Card for more Details

Die Casting Machine for Zinc

Human element is eliminated as far as possible in setting up and adjusting the HP-1-Z zinc die casting machine, built by Lester-Phoenix Inc., 2711 Church Ave., Cleveland, O. Machine gooseneck locates itself in two



machined slots in the yoke, making misalignment impossible. Plunger head is held by a T-slot coupling attached to the plunger cylinder, making the plunger completely self-aligning.

Only adjustment is with two dog point screws against the bracket, seating the gooseneck firmly against the nozzle. The pot may be made in any size desired as it is separate from the machine itself. Plunger cylinder yoke is not adjustable, being rigidly mounted on the frame of the machine. Oil lines to and from the plunger cylinder are rigid pipe lines. With plunger diameters from 2 to 2¾ inches, shot capacities of 4 to 8 pounds of zinc and with corresponding casting areas of 122 to 230 sq in. are possible.

Check No. 3 on Reply Card for more Details

Drawing Compound Spreader

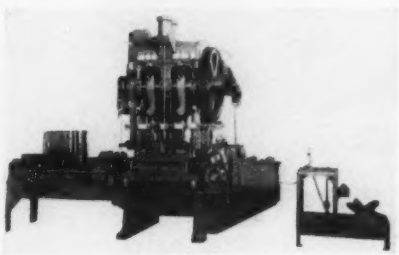
Drawing compounds are automatically applied at speeds limited only by press operation by the compound spreader announced by Union Tool Corp., 314 E. Market St., Warsaw, Ind. It applies compound with rollers that are adjustable for speed, thickness of metal and quantity of dope applied. Sheet metal is fed from roll stock or from sheets. Models take metal from 1 inch to 96 inches wide.

Inasmuch as hand brushing is eliminated, the compound is spread evenly and the operation made safer for workers. Machine pulls from the reel, applies drying compound and feeds it as fast as the operator can handle.

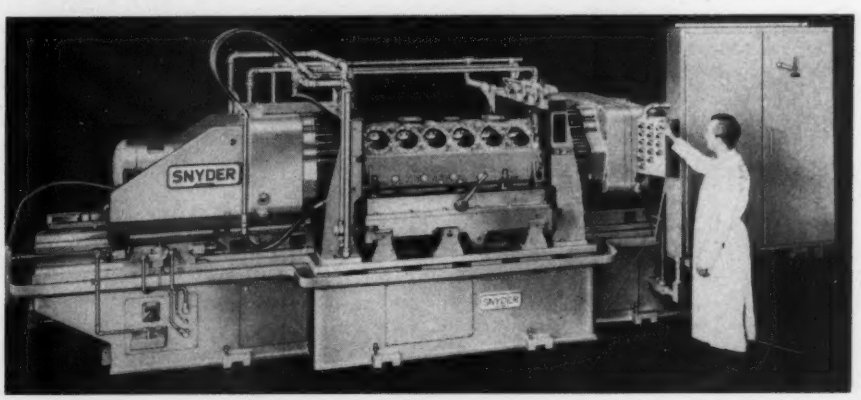
Check No. 4 on Reply Card for more Details

Press Feed and Stacking Unit

A Cleveland 40G-36 double crank gap press, built by Cleveland Punch & Shear Works Co., Cleveland 14, O., is shown in an installation with uncoiler, roll feed and stacker. Two



strips of material from 2¼ inches minimum to 3½ inches maximum width and from 21 inches minimum to 35 inches maximum length are pulled through the beading and corrugating rolls by means of the automatic roll feed in the production of radiator fins. Strips are then passed



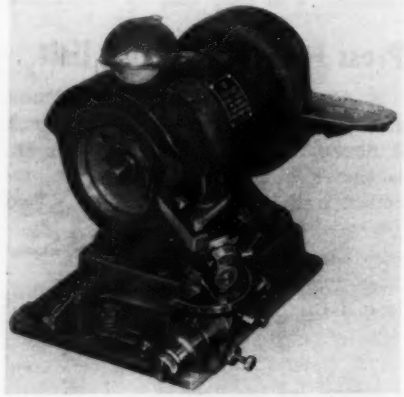
through the feed rolls into the press where they are punched and sheared to length.

Then automatically delivered to the stacker by means of rotating brushes, they are stacked from the bottom up into two separate piles by an elevator which raises stacks to permit a series of "fingers" to position the next finished pieces. Finished stacks may be removed without disturbing press operation. Stroke of slide is 1½ inches, adjustment is 3 inches and distance from bed to slide with stroke down and adjustment up is 13 inches. Press operates at 45 to 90 strokes per minute.

Check No. 5 on Reply Card for more Details

Base Converts Grinder

Almost any bench grinder may be converted into an accurate carbide grinding machine by an adapter base developed by E. F. Hager & Son, Queens Village 9, N. Y. Attachment incorporates the reciprocating action



tool holder used in larger grinders made by the company and permits accurate grinding of carbide tools with only small investment in additional equipment. It will also grind all single point cutting tools requiring exact angles.

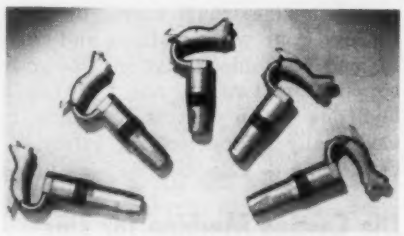
Continuing motion prevents overheating of carbide during grinding. All front, side and top angles can be set exactly in both vertical and horizontal planes and locked firmly in position. Feed towards grinding wheel is graduated in 0.001-inch divisions. Right and left hand tools up to 1¼ inches high may be held in the tool holder.

Check No. 6 on Reply Card for more Details

Chipping Hammer Line

Fifteen different combinations of speed, stroke and blow are provided by the line of Multi-Power chipping hammers offered by Rotor Tool Co., 17325 Euclid Ave., Cleveland 12, O. Line is composed of five basic models with 1, 1½, 2, 2½ and 3-inch piston strokes. Each is adjustable to three combinations of speed and blow.

Interchangeability of component parts cuts down maintenance and reduces stocking of parts. Handles, valves, valve blocks, throttle parts and locking rings are interchangeable



with all barrels. Barrel breakage has been eliminated by new methods of honing and heat treatment. Hammer weight varies from 10½ to 13⅞ pounds and length from 10⅜ to 13⅞ inches.

Check No. 7 on Reply Card for more Details

Generates Inert Gas

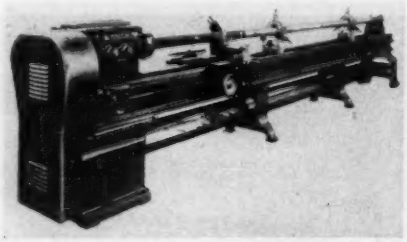
Rated at 1000 and 2000 cu ft per hour capacity are two inert gas generators, announced by C. M. Kemp Mfg. Co., 405 E. Oliver St., Baltimore 2, Md. Designated as models 1 MIHE and 2 MIHE, the units obtain the same analysis of inert gas, regardless of demand. Analysis of 87 to 88 per cent N^2 and 13 to 12 per cent CO^2 is maintained at any point from 20 to 100 per cent of rated capacity.

Water vapor is equivalent to saturation at discharge temperature. Fully automatic in operation, the initial starting is by pushbutton and manual valving after which the unit floats on the line in response to changes in demand. Ratio control for manufactured, natural, propane, butane or refinery gases is provided.

Check No. 8 on Reply Card for more Details

Lathe with Extra Long Bed

Twenty-inch general-purpose and gap type lathes are available in bed lengths up to 20 feet from King Ma-



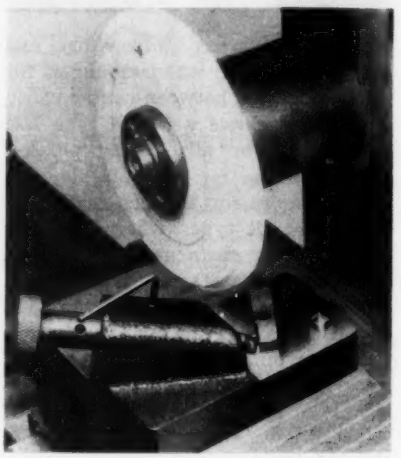
chine Tool Division, American Steel Foundries, Cincinnati 29, O. The Sebastian geared head lathes are designed to handle a full range of work, including long, lightweight pieces.

All are equipped with 8-speed geared head with Timken tapered bearings on all headstock shafts. Other features include reverse in apron for feeds, knob control handle for apron-length feed friction, 54 feed and thread changes and accuracy of 0.0005-inch at every point of alignment.

Check No. 9 on Reply Card for more Details

Accurate Sharpening Fixture

Consisting of a rectangular base placed on a magnetic bed at right angles to the wheel is a sharpening fixture for single-point boring tools, made by Bokum Tool Co., Detroit 21, Mich. Tool to be sharpened, after being put into a special adapter, is inserted into the inclined hole of the fixture far enough to make the cutting end rest against the carbide-tipped stop. It is positioned with the cutting edge a few thousandths above



the stop and aligned parallel to it.

Before grinding, the wheel must first be placed at the right height in relation to the tool to make sure that the proper amount of metal is ground down. A diamond wheel dresser in one corner of the fixture serves as a guide in setting the wheel for the most efficient performance. Fixture is designed for all Bokum standard and extra long tools, styles A and B, from No. 00000 to No. 3.

Check No. 10 on Reply Card for more Details

Burners for Open Hearths

Erosion of brickwork is reduced and roof life increased in large or small open hearth furnaces equipped with artillery burners made by Crowe Engineering Co., 1838 Western Ave., Cincinnati 14, O. Elimination of protective brickwork not only reduces erosion but prevents turbulence in the end of the furnace.

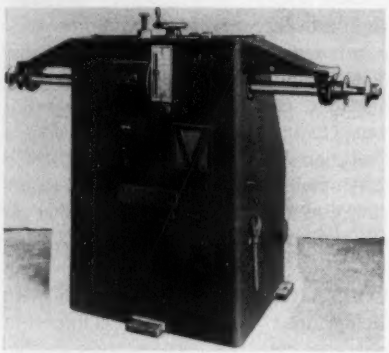
A water cooling system is built into each burner and a cleanout trap

permits flushing of sediment and water impurities. They give controlled flame direction, both horizontally and vertically. Flame adjustment for intensity is by a hand knob at the rear of the atomizer, possible while the burner is in operation. Adjustable atomizers control velocity of steam entering the fuel tube. Top burner uses straight oil when melting down and is turned off as soon as melt is under cover. Bottom burner continues working the heat with gas in combination with liquid fuel, or liquid fuel alone, until completed.

Check No. 11 on Reply Card for more Details

Buffing and Polishing Machine

An underslung spindle is incorporated in the design of a buffing and polishing machine developed by Vonnegut Moulder Corp., 1819 Madison Ave., Indianapolis 25, Ind. The Marschke machine is made with one or two spindles with various size motors ranging from 1 to 30 hp. Design makes the relatively long, thin spindle rigid because bearing support is entirely above the spindle. With this construction, neither depth nor width of the overarm need be restricted.



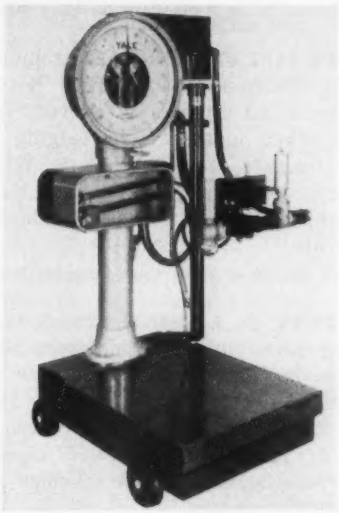
There are no structural interferences for spacing other bearings to best advantage along the underside of the bearing support or for locating the motor and power transmitting details. Design and method of manufacturing the frame provides maximum accuracy of bearing alignment. Longer and larger bearing support arm may be furnished for longer spindles to meet special requirements.

Check No. 12 on Reply Card for more Details

Fills Drums Correctly

An air-operated device developed by Yale & Towne Mfg. Co., Roosevelt Blvd. and Haldeman Ave., Philadelphia 15, Pa., fills drums to the correct weight. Liquids which may be handled include oils, paints, varnishes, and chemicals. Device is mounted on the Yale Load King scale and an empty drum is placed on the scale platform. A tear beam poise is moved until the dial indicator points to the net weight of the material desired and the valve assemby is lowered by air to the drum bunghole.

Starting when a button is pushed, the liquid flow continues until the device automatically cuts off when



the desired weight is reached. All that is required to operate the scale is air line with between 80 and 150 pounds pressure. A 52-gallon drum may be filled with SAE 30 oil at 95° F in 49 seconds. Flow can be regulated to suit the material and the operation.

Check No. 13 on Reply Card for more Details

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RETRIEVES STEEL TOOLS: Ronald Eyrich Co., Milwaukee 10, Wis., has developed a new line of powerful permanent magnets for retrieving steel tools or equipment from inaccessible places. They can be used under water and in other liquids.

Check No. 14 on Reply Card for more Details

TAPPING HAMMER: Designed for work that demands a direct tap, without marring or damaging the surface, Ready Tool Co., Bridgeport, Conn., announces the Tap-A-Hammer. It has tappers at both ends that are made of a plastic material that is compressible and able to absorb the shock of the tap. Tappers cannot break or chip.

Check No. 15 on Reply Card for more Details

FOR OUTDOOR AIR SWITCHES: A type T motor operating mechanism for outdoor air brake and disconnecting switches is available from Westinghouse Electric Corp., Pittsburgh 30, Pa. Mechanism is of the torsional output type and is available in a wide range of operating

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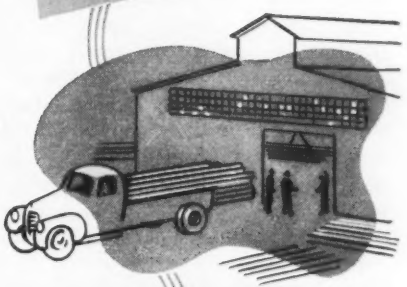

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voltages. It drives the air switch by means of a single phase or direct current motor, operating through a gear reduction to give proper operating speed.

Check No. 16 on Reply Card for more Details

ADD OR CHANGE CIRCUITS: Plug-in type Multi-breaker load centers for lighting and appliance circuits are introduced by Square D Co. Inc., Detroit, Mich. Plug-in feature makes it possible to conveniently add or change circuits as conditions require. Units are available in ratings of 15, 20, 30, 40 and 50 amp, 120/240 v, ac.

Check No. 17 on Reply Card for more Details

LIGHT WEIGHT POLISHER: A new 7-inch Junior polisher designed for intermittent service in small shops is announced by Van Dorn Electric Co., Towson 4, Md. It is a side handle type unit with a convenient reversible auxiliary side handle for right or left hand use. No-load speed is 2000 rpm.

Check No. 18 on Reply Card for more Details

TRUES SMALL WHEELS: The diamond refacer announced by Tabor Instrument Corp., North Tonawanda, N. Y., will true small abrasive wheels ranging in size from 1¾ to 2¼ inches in diameter. It is driven by a 115 v, 50/60 cycle totally enclosed motor with diamond bored bearings and the base is equipped with connection to a suction unit.

Check No. 19 on Reply Card for more Details

SIMPLIFIES ASSEMBLY: Designed to simplify disassembly and assembly of roller chain, the Baldwin-Rex BA assembly is introduced by Baldwin-Duckworth Division of Chain Belt Co., Milwaukee 4, Wis. It consists of a 5-foot basic length of standard riveted roller chain with a new single pin connector assembled at approximately the 2-foot mark and at the end of the 5-foot length. Connecting link employs one detachable pin and one rivet.

Check No. 20 on Reply Card for more Details

PLATING SMALL LOTS: A small portable plating barrel for use in still plating tanks or special tanks, is introduced by Belke Mfg. Co., Chicago 51, Ill. Porto-Plates are available in three sizes with capacities of ¼, ½ or ¾ peck. A self-contained motor drive with plug connection makes unit easy to transfer.

Check No. 21 on Reply Card for more Details

MEASURES RESISTANCE: Herman H. Sticht Co. Inc., New York, N. Y., is offering model 29 twenty million megohmmeter, an instrument designed for the precise measurement of electrical resistance over a range from 300,000 ohms to 20 million megohms. Made by Electronics Instruments Ltd., Surrey, England, the power supply of the unit is line voltage from 110 to 115 and 190 to 260 v, ac. There are two test potentials of 85 and 500 v, dc.

Check No. 22 on Reply Card for more Details

CAPS FOR FITTINGS: Elastoplastic caps, designed to fit over ⅜-inch Alemite dot fittings to prevent dirt and other matter from lodging on the tip, are offered by S. S. White Dental Mfg. Co., New York 16, N. Y. Caps are made of black, flexible vinylite.

Check No. 23 on Reply Card for more Details

SAFETY IN LIFTING: Necessity of sling users splicing their own sling loops is eliminated by the new tapered sleeve splice developed by John A. Roebling's Sons Co., Trenton 2, N. J. The rolled loop and tapered sleeve attachment each develops full catalog strength.

Check No. 24 on Reply Card for more Details

CORRELATES INSTRUMENTS: Aircraft Electronics Associates, Hartford, Conn., announces a new instrument, the Sono Probe correlator for use in correlating two or more Sono Probes or other vibration measurement instruments. The correlator permits feeding to the vibration measurement device a vibration of known frequency and intensity.

Check No. 25 on Reply Card for more Details

CONTROL FOR AIR POWER: Beckett-Harcum Co., Wilmington, O., offers the Hi-Cyclic air valve for fast and smooth control for air power. It functions the same as any operating valve, but also will control stroke of an air cylinder within 0.001-inch; stop and return stroke at any point without overtravel; control speed of stroke in either direction; reciprocate mechanically or electrically; control pressure in both ends of the cylinder.

Check No. 26 on Reply Card for more Details

FOR INDUSTRIAL SERVICE: Three new electron tubes suitable for a wide range of industrial services where a service life up to 10,000 hours is required are available from Sylvania Electric Products Inc., New York, N. Y. Types include 5691, a high-mu twin triode recommended for voltage amplifier use and supplied with series unit heater; 5692, a medium-mu twin triode with series unit heater suitable for balanced direct current amplifier, multivibrator, blocking oscillator and resistance coupled amplifier applications; and 5693, a sharp cutoff pentode designed for high-gain resistance coupler amplifier service.

Check No. 27 on Reply Card for more Details

ADJUSTABLE TIMER: Bulletin 849 pneumatic timing relay is a new adjustable timer announced by Allen-Bradley Co., Milwaukee, Wis. It is available for alternating or direct current and utilizes a synthetic rubber bellows for controlling the tripping time. Range is adjustable from 10 cycles to 3 minutes.

Check No. 28 on Reply Card for more Details

BENT HANDLES: J. H. Williams & Co., Buffalo 7, N. Y., introduces 45 and 90 degree bent handle construction wrenches in both carbon and alloy steels. The bent handles facilitate work in close quarters; wrench is particularly useful on flange and pipe line work in refineries. Openings are ⅞ to 2 inches.

Check No. 29 on Reply Card for more Details

ABSORB DISTRIBUTING FREQUENCIES: Vibration may be dampened at extreme high and low temperatures through the use of Cohrlastic mounting developed by Connecticut Hard Rubber Co., New Haven, Conn. Mountings will carry their designed loads and absorb disturbing frequencies within the temperature range of minus 100° F to plus 500° F.

Check No. 30 on Reply Card for more Details

PORTABLE ELECTRIC WINCH: Designated as Stampco Tugger, a portable electric winch powered to furnish a line pull of from 500 to 1500 pounds at speeds ranging from 55 to 220 feet a minute, is offered by St. Anthony Machine Products Co., Minneapolis, Minn. It is available in six models and capacities.

Check No. 31 on Reply Card for more Details

ELECTRONICALLY CONTROLLED PROBE: A sound probe that localizes sound electronically bringing it to a focal point is announced by Como-Tex Co., Chicago 1, Ill. It may be accurately traced to its source. Amplification of the sound immediately reveals its true character whether normal or foreign.

Check No. 32 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Helpful Literature

73. Steel Castings

Continental Foundry & Machine Co.—32-page illustrated brochure deals with twelve basic considerations which should govern selection of supplier of steel castings and other industrial suppliers. Listed are steel castings for machinery and construction, dredging, hydroelectric and heavy mill equipment.

74. Elevating Positioners

Lyon-Raymond Corp.—4-page temporary bulletin No. 440 describes three basic types of hydraulic elevating positioners and several optional interchangeable attachments which adapt positioners to many types of jobs. Units are designed to reduce manual handling, spoilage and fatigue.

75. Press Brakes

Verson Allsteel Press Co.—4-page illustrated bulletin 16-48-A describes model 16-48 power press brake which features variable speed arrangement to provide 20 to 50-stroke per minute operation, totally enclosed friction clutch, self-releasing brake band and V-belt motor drive.

76. Broaching Machines

Colonial Broach Co.—4-page illustrated bulletin RU-49 outlines features of Pull-Up type broaching machines available in 6, 10, 15 and 25-ton capacities. Dimensional drawings, operating specifications and list of accessory equipment are given also.

77. Rust Prevention

Nox-Rust Chemical Corp. — "Rust Preventive Use" chart is source of data on rustproofing of metal parts for protection against elements. Given in tabular form are correct rust protection methods for metal parts to be stored either indoors or outdoors and how to apply and remove rust preventive material.

78. Bearings & Castings

American Brake Shoe Co., National Bearing Div. — 28-page illustrated booklet entitled "Bronze and Copper Bearings and Castings" gives physical properties and comparative specifications of 27 different bronze alloys and five aluminum and manganese bronzes. Also described are manufacturing facilities of company for fabricating nonferrous bearings and castings.

79. Fasteners

Pheoll Mfg. Co.—28-page illustrated catalog No. 80-A describes applications of Sems lock washer screws for use in partial or complete assembly operations. Fasteners consist of two parts forming integral unit with locking washer securely held in place by rolled screw thread but rotating freely on screw shank below head.

80. Industrial Crane

Silent Hoist & Crane Co.—6-page illustrated bulletin No. 73 depicts uses of Karri-Go 5-ton capacity front-boom industrial crane in shops, stores, yards and in and around dock and shipping platforms.

81. Self-Locking Set Screw

Set Screw & Mfg. Co.—2-page illustrated leaflet "Zip-Grip Self-locking Set Screws and Adjusting Screws" explains operation of set screw that locks by interference fit. Screws are available in standard sizes up to ⅝-11-in. with any type head.

82. Combustion Controllers

Selas Corporation of America—12-page illustrated bulletin SC-2.1 lists various combustion controllers designed to give precise automatic control in industrial processes which utilize heat processing in continuous or intermittent operations.

83. Centrifugal Pumps

Worthington Pump & Machinery Corp.—12-page illustrated bulletin W-350-B11 describes centrifugal chemical pumps designed for process industries, Worthite corrosion-resistant metal and mechanical seal used to prevent leakage of corrosive liquids.

84. Tool & High Speed Steels

Allegheny Ludlum Steel Corp.—16-page booklet "The Working of Tool and High Speed Steels" gives specific information summarized from laboratory and service tests on various grades in A-L line. Including selector chart and properties of each type, publication gives procedures and tabulations designed to form working manual for makers and users of cutting tools and dies.

85. Plastics Molding Press

F. J. Stokes Machine Co.—4-page illustrated folder No. 501 describes in detail model 723 self-contained semiautomatic general-purpose 200-ton molding press which molds large parts having deep draws and heavy sections.

86. Sheet Copper Installation

Revere Copper & Brass Inc.—23-page Master Specification No. 100 deals with copper roofing and sheet metal work in construction of institutional, commercial and industrial building. Classifications include flat, standing and batten seam roofing; flashings; gutters and leads; splash pans; cornices and belt courses; scuttles; and eave snow flashings.

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HELPFUL LITERATURE

87. Stainless Steel Hardening

C. U. Scott & Son, Inc.—24-page illustrated booklet "Now Stainless Steel 18-8 So Hard That It Will Scratch a Diamond" explains hardening of stainless steel finished machined parts by Super Scottsonizing method. Case produced has depth from 0.003 to 0.005-in. and has hardness ranging from Rockwell 68 to 70 C.

88. Hydraulic Power Pump

Superdraulic Corp.—4-page illustrated form "Junior Constant and Variable Delivery Pumps" describes line of hydraulic power pumps which feature small size, large horsepower, pulsation-free delivery and hydraulic balance. Constant delivery types are rated from 3½ to 20 hp up to 6 gpm at 5000 psi. Variable delivery pumps with manual control are rated 20 hp maximum at 6 gpm and 5000 psi.

89. Temperature Indicators

General Electric Co.—8-page illustrated bulletin GEC-565 presents various temperature indicators and accessories for industrial applications. They include resistance thermometers for temperatures up to 300° F and thermocouple thermometers for temperatures up to 3000° F.

90. Contour Projector

Eastman Kodak Co., Industrial Optical Sales Div.—8-page illustrated booklet describes Contour Projector and provides information on rapid optical inspection of parts by comparing enlarged image of part with tolerance chart.

91. Spring Plating

Reliable Spring & Wire Forms Co.—Bulletin "Selecting Protective Finishes for Springs" gives useful technical data on various spring platings, their properties, purposes, cost of several plating methods and other subjects.

92. Run-Out Trough Liners

National Carbon Co., Inc.—Illustrated catalog section M-8705 describes use of carbon blocks for lining run-out troughs of blast furnaces. Bulletin outlines design, installation, operation and ordering information, with pictorial and sectional illustrations.

93. Air Operated Press

Hannifin Corp.—4-page illustrated bulletin No. 250 provides production engineers with information on design, dimensions and capacities of air operated arbor presses for production assembly, forming, bending, molding, staking and other operations.

94. Inventory Control

International Business Machines Corp.—4-page illustrated form No. 52-5732-0 tells how IBM service bureaus provide factual inventory information to control accounting, purchasing, planning and production. Based on IBM principle of accounting, system records, and classifies inventory materials on punched cards for accurate printed report.

95. Sensitive Drill Operation

Fosdick Machine Tool Co.—16-page illustrated manual "Instruction for Installing and Operating 4BM and 5BM Fosdick Sensitive Drills" discusses moving machines, cleaning, making foundation, lubrication, operation, power feed, reversing motor tapping, combination power feed and tapping and making repairs.

96. Gas & Liquid Analyzer

Mine Safety Appliances Co.—4-page illustrated brochure No. DZ-4 discusses construction and operation of LIRA infrared analyzer for measuring atmospheric contamination of gases and liquids and for precise process control. In some instances, it can defect concentrations of less than 1 part per million.

97. Welding Alloys

Eutectic Welding Alloys Corp.—Two 2-page illustrated leaflets describe, respectively, EutecTrode 24/49 ac-dc rod for welding cast iron in position with cold arc electrode and typical savings of firms using low temperature welding alloys for all maintenance and production welding jobs.

98. Light Cranes & Monorails

Whiting Corp.—Publication entitled "Whiting Light Cranes & Monorails" is composite of seven illustrated bulletins dealing with Trambeam overhead materials handling systems. They lift materials safely and economically and move them quickly anywhere on system without rehandling.

99. Oil Cup-Gage

Trico Fuse Mfg. Co.—2-page illustrated bulletin No. 31 describes combination oil cup and oil gage with clear shatterproof plastic reservoir. Oil level is visible from any direction so that it can be installed at any convenient distance from machine. Available in 1, 2, 4 and 8-oz sizes, unit has self-closing dustproof filler cap.

100. Strain Gages

Baldwin Locomotive Works—12-page illustrated bulletin No. 279-A tells how to select and use SR-4 bonded resistance wire strain gages in stress analysis. It explains fundamentals of both simple and practical strain gage circuits and instruments, illustrating eight circuits and eight different types of instruments.

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Market Summary

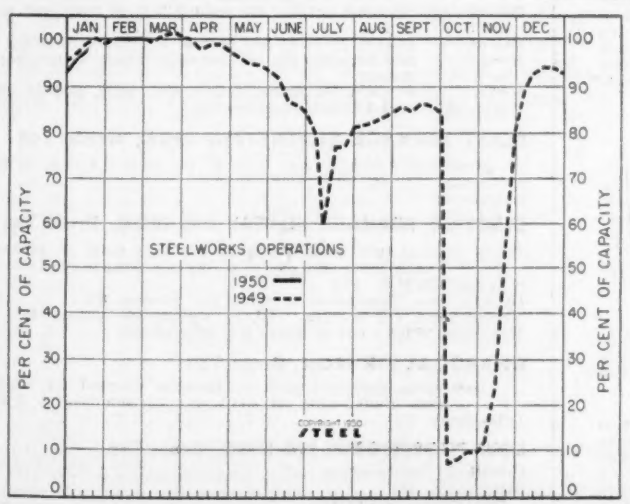
STEELMAKING operations are roaring along at 97 per cent of capacity. This is the highest rate since the first week in May, last year. Further rise is indicated, requirements of durable consumer goods taxing mill facilities to the limit. Sellers are under pressure for shipments of the light, flat-rolled products. Automotive, household appliance and similar large consumers of such items are specifying heavily. Producers are at least two months behind on deliveries due to last fall's steel strike. Heavy products are more sluggish and tonnage is available for shipment before end of first quarter.

OPERATIONS— The national ingot rate at 97 per cent is equivalent to production of about 1,791,000 net tons weekly. It compares with weekly output of 1,830,000 tons at this time last year. Only a few district rates changed. Advances more than offset declines.

FLAT-ROLLED PRODUCTS— With consumers pressing the mills for every pound of sheet and strip available, producers are meeting difficulty in clearing away arrearages. Actually, sufficient new business could be booked by the sheetmakers to assure capacity operations into third quarter. All the mills have more tonnage on their books now than they can deliver on schedule. At least two are not yet formally accepting second quarter business, holding substantially more orders than they can get out in the current quarter. Several are entertaining more tonnage than they can accommodate in the first six months but they are continuing to book new business. For all practical purposes they are accepting tonnage for third quarter shipment. Some of this forward booking may be insurance against possible order cutbacks.

OTHER PRODUCTS— Activity in heavier products is not comparable with that in flat-rolled. Tonnage is available before end of first quarter. Only slight gains are noted in railroad requirements. Shipyard work is marking time. Building needs are seasonally slow. Substantial pickup in this latter area is expected next month. Plate producers, seeking tonnage aggressively, can give delivery in three weeks. Some carbon bar sellers are booked into March but others promise shipment on new orders in four to five weeks, especially larger sizes. Cold-finished bar deliveries average four to five weeks. Alloy bars are in easy supply. Foundry activity is reported on the upside in some areas but new orders for merchant pig iron are limited. Coke supplies are tight, though not acutely so. A strike at 26 eastern foundries is contributing to sluggish demand for materials in the East.

PRICES— The pig iron market is showing signs of price strength. Last week Republic Steel Corp. advanced prices $3 per ton on basic and No. 2 foundry iron at Birmingham, Ala. Whether this signals the beginning of a general rise on pig iron was considered doubtful, however. Isolated advances on finished steel continue as individual producers bring their schedules into line with the higher levels announced by the larger steelmakers. Some deviations from the general pattern are noted, but, in the main, the markets now are stabilized at uniform levels. Steel buyers are seeking to absorb the steel price increase as far as possible but it will be some time before actual effect on finished goods prices can be determined. With the market jelled STEEL's weighted index on finished steel held last week at 156.13. This compares with 155.05 a year ago. The arithmetical composite on finished steel is steady at the revised figure of $92.59 and compares with $97.77 last year. The composite on basic iron rose to $45.72 from $45.60 and that on No. 2 foundry to $46.22 from $46.10. Malleable iron held steady at $47.27. Scrap is moving sluggishly, price composite unchanged at $26.83.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Jan. 14	Change	Same Week 1949	Same Week 1948
Pittsburgh	97	None*	98.5	102
Chicago	97.5	None*	99.5	95
Eastern Pa.	86	None	95	90
Youngstown	102	None	105	103
Wheeling	96	— 2	92.5	93.5
Cleveland	98	None*	96.5	91
Buffalo	103.5	None	104	86
Birmingham	100	None	100	102
New England	83	+ 3	86	83
Cincinnati	96	—10	99	91
St. Louis	86.5	— 3	80	89.5
Detroit	107	— 2	105	91
Western	92	+ 9	..	..
Estimated national rate	97	+ 0.5	99	98

Based on weekly steelmaking capacity of 1,843,516 net tons for 1950 and 1949; 1,802,476 net tons for 1948.

* Change from revised rate.

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Composite Market Averages

	Jan. 12 1950	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100)	156.13	156.13	152.52	155.05	100.32
Index in cents per lb ..	4.230	4.230	4.132	4.200	2.718
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$92.59	$92.59*	$91.64	$97.77	$57.55
No. 2 Fdry Pig Iron, GT	46.22	46.10	46.10	46.69	23.67
Basic Pig Iron, GT	45.72	45.60	45.60	46.29	23.00
Steelmaking Scrap, GT..	26.83	26.83	28.25	41.92	19.17

* Revised.

Weighted finished steel index based on average shipments and prices of the following 14 representative products during 5-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Jan. 12 1950	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh...	3.45	3.45	3.35	3.35–55	2.15
Bars, H.R., Chicago	3.45	3.45	3.35	3.35	2.15
Bars, C.F., Pittsburgh....	4.10-4.15	4.10-4.15	3.95-4.00	3.95-4.25	2.65
Shapes, Std., Pittsburgh ..	3.40	3.40	3.25	3.25–30	2.10
Shapes, Std., Chicago	3.40	3.40	3.25	3.25	2.10
Plates, Pittsburgh	3.50	3.50	3.40	3.40–60	2.20
Plates, Chicago	3.50	3.50	3.40	3.40	2.20
Plates, Coatesville, Pa. ..	3.60	3.60	3.50	3.75	2.20
Plates, Sparrows Point, Md.	3.50	3.50	3.40	3.45	2.20
Plates, Claymont, Del.	3.60	3.60	3.50	3.95	2.20
Sheets, H.R., Pittsburgh ..	3.35	3.35	3.25	3.25–30	2.20
Sheets, H.R., Chicago	3.35	3.35	3.25	3.25	2.20
Sheets, C.R., Pittsburgh ..	4.10	4.10	4.00	4.00	3.05
Sheets, C.R., Chicago.....	4.00	4.00	4.00	4.00	3.05
Sheets, C.R., Detroit	4.20	4.20	4.20	4.20	3.15
Sheets, Galv., Pittsburgh..	4.40	4.40	4.40	4.40	3.65
Strip, H.R., Pittsburgh ...	3.25	3.25	3.25	3.25–70	2.10
Strip, H.R., Chicago	3.25	3.25	3.25	3.25–30	2.10
Strip, C.R., Pittsburgh....	4.15	4.15	4.00	4.00–75	2.80
Strip, C.R., Chicago	4.00–15	4.00–15	4.00–15	4.00–25	2.90
Strip, C.R., Detroit	4.20–40	4.20–40	4.20–25	4.20–50	2.90
Wire, Basic, Pittsburgh ...	4.50	4.50	4.15	4.15–4.50	2.60
Nails, Wire, Pittsburgh ...	5.30	5.30	5.15	5.15–6.30	2.80
Tin plate, box, Pittsburgh.	$7.50	$7.50	$7.75	$6.70	$5.00

SEMIFINISHED

Billets, forging, Pitts.(NT)	$63.00	$63.00	$61.00	$61.00	$40.00
Sheet bar, mill (NT)	51.78–57.00	51.78–57.00	51.78–57.00	67.00	34.00
Wire rods, $\frac{7}{32}$-⅜", Pitts. ..	3.85	3.85	3.40	3.40–4.15	2.00

PIG IRON, Gross Ton

Bessemer, Pitts.	$47.00	$47.00	$47.00	$47.00	$24.50
Basic, Valley	46.00	46.00	46.00	46.00	23.50
Basic, del. Phila.	49.44	49.44	49.44	50.30	25.34
No. 2 Fdry, Pitts.	46.50	46.50	46.50	46.50	24.00
No. 2 Fdry, Chicago	46.50	46.50	46.50	46.00–46.50	24.00
No. 2 Fdry, Valley	46.50	46.50	46.50	46.50	24.00
No. 2 Fdry, del. Phila. ...	49.94	49.94	49.94	50.80	25.84
No. 2 Fdry, Birmingham.	39.88-42.38	39.38	39.38	43.38	20.38
No. 2 Fdry.(Birm.)del Cin.	46.08	46.08	46.08	49.43	24.06
Malleable, Valley	46.50	46.50	46.50	46.50	24.00
Malleable, Chicago	46.50	46.50	46.50	46.50	24.00
Charcoal, Lyles, Tenn.	60.00	60.00	60.00	66.00	33.00
Ferromanganese, Etna, Pa.	175.00	175.00	175.00	163.00	140.33*

* Delivered, Pittsburgh.

SCRAP, Gross Ton

No. 1 Heavy Melt. Pitts. ..	$30.00	$30.00	$31.00	$42.75	$21.00
No. 1 Heavy Melt. E. Pa. .	23.50	23.50	24.75	43.25	18.75
No. 1 Heavy Melt. Chicago	27.00	27.00	29.00	39.75	19.75
No. 1 Heavy Melt. Valley..	30.25	30.25	31.75	40.75	20.00
No. 1 Heavy Melt. Cleve..	27.25	27.25	29.75	40.25	19.50
No. 1 Heavy Melt. Buffalo	27.75	27.75	29.75	47.00	19.25
Rails, Rerolling, Chicago..	39.50	39.50	43.50	59.50	22.25
No. 1 Cast, Chicago.....	38.50	38.50	42.50	63.50	20.00

COKE, Net Ton

Beehive, Furn., Connlsvl. .	$13.25	$13.25	$13.25	$14.50	$7.00
Beehive, Fdry., Connlsvl. .	15.50	15.50	15.50	17.00	7.75
Oven Fdry., Chicago	20.00	20.00	20.00	20.40	13.35

NONFERROUS METALS

Copper, del. Conn.	18.50	18.50	18.50	23.50	12.00
Zinc, E. St. Louis.....	9.75-10.00	9.75-10.00	9.75	17.50	8.25
Lead, St. Louis	11.80	11.80	11.80	21.30–35	6.35
Tin, New York	77.00	77.50	79.00	103.00	52.00
Aluminum, del.	17.00	17.00	17.00	17.00	15.00
Antimony, Laredo, Tex. ..	32.00	32.00	32.00	38.50	14.50
Nickel, refinery, duty paid.	40.00	40.00	40.00	40.00	35.00

Pig Iron

For key to producing companies, turn next page.
Minimum delivered prices do not include 3% federal tax.

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem,Pa. B2	$48.00	$48.50	$49.00	$49.50
Newark,del.	50.63	51.13	51.63	52.13
Brooklyn,N.Y.,del.	....	52.79	53.29	....
Birmingham District				
Birmingham R2	*41.88*	*42.38*	....	....
Birmingham S9	38.88	39.38	....	....
Woodward,Ala. W15	38.88	39.38	....	....
Cincinnati,del.	....	46.08	....	....
Buffalo District				
Buffalo H1, R2	46.00	46.50	47.00	....
Tonawanda,N.Y. W12	46.00	46.50	47.00	....
N.Tonawanda,N.Y. T9	....	46.50	47.00	....
Boston,del.	55.26	55.76	56.20	....
Rochester,N.Y.,del.	48.63	49.13	49.63	....
Syracuse,N.Y.,del.	49.58	50.08	50.58	....
Chicago District				
Chicago I-3	46.00	46.50	46.50	47.00
Gary,Ind. C3	46.00	....	46.50	....
IndianaHarbor,Ind. I-2	46.00	....	46.50	....
So.Chicago,Ill. W14	46.00	46.50	46.50	....
So.Chicago,Ill. C3	46.00	....	46.50	47.00
So.Chicago,Ill. Y1	46.00	46.50	46.50	....
Milwaukee,del.	47.89	48.39	48.39	48.89
Muskegon,Mich.,del.	....	51.98	51.98	....
Cleveland District				
Cleveland A7	46.00	46.50	46.50	47.00
Cleveland R2	46.00	46.50	46.50	....
Akron,del. from Cleve.	48.39	48.89	48.89	49.39
Lorain,O. N3	46.00	....	....	47.00
Duluth I-3	....	....	46.50	....
Erie,Pa. I-3	46.00	46.50	46.50	47.00
Everett,Mass. E1	....	50.50	51.00	....
Fontana,Calif. K1	52.00	52.50	....	....
Geneva,Utah G1	46.00	46.50	....	....
Seattle,Tacoma,Wash.,del.	....	54.20	....	....
Portland,Oreg.,del.	....	54.20	....	....
LosAngeles,SanFrancisco,del.	53.70	54.20	....	....
GraniteCity,Ill. M10	47.90	48.40	48.90	....
St.Louis,del.(incl. tax)	48.65	49.15	49.65	....
Ironton,Utah C11	46.00	46.50	....	....
Minnequa,Colo. C10	47.00	47.50	47.50	....
Pittsburgh District				
NevilleIsland,Pa. P6	46.00	46.50	46.50	47.00
Pitts.N.&S. sides, Ambridge, Aliquippa,del.	47.19	47.69	47.69	48.19
McKeesRocks,del.	46.95	47.45	47.45	47.95
Lawrenceville,Homestead, McKeesport,Monaca,del.	47.44	47.94	47.94	48.44
Verona,del.	47.90	48.40	48.40	48.90
Brackenridge,del.	48.13	48.63	48.63	49.13
Bessemer,Pa. C3	46.00	....	46.50	47.00
Clairton,Rankin,So.Duquesne,Pa. C3	46.00	....	....	....
McKeesport,Pa. N3	46.00	....	....	47.00
Sharpsville,Pa. S6	46.00	46.50	46.50	47.00
Steelton,Pa. B2	48.00	48.50	49.00	49.50
Steubenville,O. W10	46.00	....	....	....
Struthers,O. S16	46.00	....	....	....
Swedeland,Pa. A3	48.00	48.50	49.00	49.50
Philadelphia,del.	49.44	49.94	50.44	50.94
Toledo,O. I-3	46.00	46.50	46.50	47.00
Cincinnati,del.	51.01	51.51	....	....
Troy,N.Y. R2	48.00	48.50	49.00	....
Youngstown District				
Hubbard,O. Y1	46.00	46.50	46.50	....
Youngstown C3	46.00	....	....	47.00
Youngstown Y1	46.00	46.50	46.50	47.00
Mansfield,O.,del.	50.26	50.76	50.76	51.26

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1%, or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; Add $1 for each 0.5% Si to 11.50%)

Jackson,O. J1, G2	$59.50
Buffalo H1	60.75

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for 0.045% max. P)

NiagaraFalls,N.Y. P15	$71.50
Keokuk,Iowa, Openhearth & Fdry, frt. allowed K2	77.00
Keokuk,Iowa, OH & Fdry., 12½ lb. piglets, frt. allowed K2.	82.00
Wenatchee,Wash., OH & Fdry, frt. allowed K2.....	77.00

CHARCOAL PIG IRON, Gross Ton

(Low phos, semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

Lyles,Tenn. T3	$60.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Cleveland, Intermediate, A7	$51.00
Steelton,Pa. B2	54.00
Philadelphia delivered	57.00
Troy,N.Y. R2	54.00

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Semifinished and Finished Steel Products

Mill prices as reported to STEEL, Jan. 12, 1950; cents per pound unless otherwise noted. Changes shown in italics.
Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)
Detroit R7 ..... $50.00
Munhall,Pa. C3 ..... 50.00

INGOTS, Alloy (NT)
Detroit R7 ..... $51.00
Houston,Tex. S5 ..... 59.00
Midland,Pa. C18 ..... 51.00
Munhall,Pa. C3 ..... 51.00
So.Duquesne,Pa. C3 ... 51.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bessemer,Pa. C3 ..... $53.00
Clairton,Pa. C3 ..... 53.00
Conshohocken,Pa. A3 .. 58.00
Ensley,Ala. T2 ..... 53.00
Farfield,Ala. T2 ..... 53.00
Fontana,Cal. K1 ..... 72.00
Gary,Ind. C3 ..... 53.00
Johnstown,Pa. B2 ..... 53.00
Lackawanna,N.Y. B2 .. 53.00
Munhall,Pa. C3 ..... 53.00
Sharon,Pa. S3 ..... 57.00
So.Chicago,Ill. C3 ..... 53.00
So.Duquesne,Pa. C3 ... 53.00
Carbon, Forging (NT)
Bessemer,Pa. C3 ..... $63.00
Buffalo R2 ..... 63.00
Canton,O. R2 ..... 63.00
Clairton,Pa. C3 ..... 63.00
Cleveland R2 ..... 63.00
Conshohocken, Pa. A3 .. 63.00
Detroit R7 ..... 63.00
Ensley,Ala. T2 ..... 63.00
Fairfield,Ala. T2 ..... 63.00
Fontana,Calif. K1 ... 82.00
Gary,Ind. C3 ..... 63.00
Geneva,Utah G1 ..... 63.00
Houston,Tex. S5 ..... 74.00
Ind.Harbor,Ind. I-2 .. 63.00
Johnstown,Pa. B2 .... 63.00
Lackawanna,N.Y. B2 .. 63.00
Munhall,Pa. C3 ..... 63.00
So.Chicago C3 R2 W14 .. 63.00
So.Duquesne,Pa. C3 ... 63.00
Warren,O. C17 ..... 63.00
Alloy (NT)
Bethlehem,Pa. B2 .... $66.00
Buffalo R2 ..... 66.00
Canton,O. R2 ..... 66.00
Canton,O. T7 ..... 66.00
Conshohocken,Pa. A3 .. 65.00
Detroit R7 ..... 66.00
Fontana,Calif. K1 .... 82.00
Gary,Ind. C3 ..... 63.00
Houston,Tex. S5 ..... 74.00
Johnstown,Pa. B2 .... 63.00
Lackawanna,N.Y. B2.. 66.00
Massillon,O. R2 ..... 66.00
Midland,Pa. C18 ..... 66.00
Munhall,Pa. C3 ..... 63.00
Sharon,Pa. S3 ..... 66.00
So.Chicago,Ill. R2 W14 .. 66.00
So.Chicago,Ill. C3 .... 63.00
So.Duquesne,Pa. C3 ... 63.00
Warren,O. C17 ..... 66.00

SHEET BARS (NT)
Mansfield,O. E6 (GT) .$58.00
Sharon,Pa. S3 ..... 57.00

ROUNDS, SEAMLESS TUBE (NT)
Canton,O. R2 ..... $76.00
Cleveland R2 ..... 76.00
Ind.Harbor,Ind. I-2 ... 76.00
Massillon,O. R2 ..... 76.00
So.Chicago,Ill. R2 .... 76.00

SKELP
Aliquippa,Pa. J5 ..... 3.15
Munhall,Pa. C3 ..... 3.15
Warren,O. R2 ..... 3.15
Youngstown C3, R2 .... 3.15

WIRE RODS
AlabamaCity,Ala. R2 ... 3.85
Buffalo W12 ..... 3.85
Cleveland A7 ..... 3.85
Donora,Pa. A7 ..... 3.85
Fairfield,Ala. T2 ..... 3.85
Houston,Tex. S5 ..... 4.25
Ind.Harbor,Ind. Y1 .... 3.85
Johnstown,Pa. B2 ..... 3.85
Joliet,Ill. A7 ..... 3.85
Los Angeles B3 ..... 4.20
Monessen,Pa. P7 ..... 3.85
Pittsburg,Calif. C11 .... 4.50
Portsmouth,O. P12 ..... 3.85
Roebling,N.J. R5 ..... 3.95
So.Chicago,Ill. R2 .... 3.85
SparrowsPoint B2 ..... 3.95
Sterling,Ill.(1) N15 .... 3.85
Struthers,O. Y1 ..... 3.85
Torrance,Calif. C11 .... 4.65
Worcester,Mass. A7 .... 4.15

SHEET STEEL PILING
Ind.Harbor,Ind. I-2 .... 4.20
Lackawanna,N.Y. B2 .. 4.05
Munhall,Pa. C3 ..... 4.20
So.Chicago,Ill. C3 .... 4.20
Weirton,W.Va. W6 .... 4.05

STRUCTURALS
Carbon Steel Stand. Shapes
Aliquippa,Pa. J5 ..... 3.40
Bessemer,Ala. T2 ..... 3.40
Bethlehem,Pa. B2 ..... 3.45
Clairton,Pa. C3 ..... 3.40
Fairfield,Ala. T2 ..... 3.40
Fontana,Calif. K1 ..... 4.00
Gary,Ind. C3 ..... 3.40
Geneva,Utah G1 ..... 3.40
Houston,Tex. S5 ..... 3.80
Ind.Harbor,Ind. I-2 ... 3.40
Johnstown,Pa. B2 ..... 3.30
KansasCity,Mo. S5 ..... 4.00
Lackawanna,N.Y. B2 .. 3.30
LosAngeles B3 ..... 4.00
Minnequa,Colo. C10 .... 3.75
Munhall,Pa. C3 ..... 3.40
Niles,Calif. (22) P1 .... 3.97
Phoenixville,Pa. P4 .... 3.30
Portland,Oreg. O4 ..... 3.90
Seattle B3 ..... 4.05
So.Chicago,Ill. C3, W14 .. 3.40
So.SanFrancisco B3 .... 3.95
Torrance,Calif. C11 .... 4.00
Weirton,W.Va. W6 .... 3.40
Alloy Stand. Shapes
Clairton,Pa. C3 ..... 4.05
Fontana,Calif. K1 ..... 5.25
Munhall,Pa. C3 ..... 4.05
So.Chicago,Ill. C3 ..... 4.05
H.-S. Low-Alloy Stand. Shapes
Aliquippa,Pa. J5 ..... 5.15
Bessemer,Ala. T2 ..... 5.15
Bethlehem,Pa.(14) B2 .. 5.20
Clairton,Pa. C3 ..... 5.15
Fairfield,Ala. T2 ..... 5.15
Fontana,Calif. K1 ..... 5.75
Gary,Ind. C3 ..... 5.15
Ind.Harbor,Ind. I-2, Y1 .. 5.15
Johnstown,Pa. B2 ..... 5.20
Lackawanna,N.Y.(14)B2 5.20
Munhall,Pa.(14) C3 .... 5.15
So.Chicago,Ill.(14) C3 .. 5.15
Struthers,O. Y1 ..... 5.15
Wide Flange
Bethlehem,Pa. B2 ..... 3.45
Lackawanna,N.Y. B2 ... 3.45
Munhall,Pa. C3 ..... 3.40
So.Chicago,Ill. C3 .... 3.40
H-S., L-A. Wide Flange
Munhall,Pa. C3 ..... 5.10
So.Chicago,Ill., C3 .... 5.10
PLATES, Carbon Steel
AlabamaCity,Ala. R2 .. 3.50
Aliquippa,Pa. J5 ..... 3.50
Ashland,Ky. (15) A10.. 3.50
Bessemer,Ala. T2 ..... 3.50
Clairton,Pa. C3 ..... 3.50
Claymont,Del. W16 .... 3.60
Cleveland J5, R2 ..... 3.50
Coatesville,Pa. L7 .... 3.60
Conshohocken,Pa. A3... 3.60
Ecorse,Mich. G5 ..... 3.75
Fairfield,Ala. T2 ..... 3.50
Fontana,Calif. K1 ..... 4.10
Gary,Ind. C3 ..... 3.50
Geneva,Utah G1 ..... 3.50
Harrisburg,Pa. C5 .... 3.50
Houston,Tex. S5 ..... 3.90
Ind.Harbor,Ind. I-2, Y1.. 3.50
Johnstown,Pa. B2 ..... 3.50
Lackawanna,N.Y. B2 ... 3.50
Minnequa,Colo. C10 .... 4.30
Munhall,Pa. C3 ..... 3.50
Pittsburgh J5 ..... 3.50
Seattle B3 ..... 4.40
Sharon,Pa. S3 ..... 3.50
So.Chicago,Ill. C3, W14.. 3.50
SparrowsPoint,Md. B2 .. 3.50
Steubenville,O. W10 ... 3.50
Warren,O. R2 ..... 3.50
Weirton,W.Va. W6 ..... 3.50
Youngstown C3, Y1 ... 3.50
PLATES (Universal Mill)
Fontana,Calif. K1 ..... 4.40
PLATES, Carbon, A.R.
Fontana,Calif. K1 ..... 5.25
PLATES, Open-Hearth Alloy
Coatesville,Pa. L7 ..... 4.50
Conshohocken,Pa. A3 .. 4.40
Fontana,Calif. K1 ..... 5.40
Gary,Ind. C3 ..... 4.40
Johnstown,Pa. B2 ..... 4.40
Munhall,Pa. C3 ..... 4.40
Sharon,Pa. S3 ..... 4.40
So.Chicago,Ill. C3 ..... 4.40
SparrowsPoint,Md. B2 .. 4.40
FLOOR PLATES
Cleveland J5 ..... 4.55
Conshohocken,Pa. A3 ... 4.55
Harrisburg,Pa. C5 .... 4.55
Ind.Harbor,Ind. I-2 .... 4.55
Munhall,Pa. C3 ..... 4.55
So.Chicago,Ill. C3 ..... 4.55

PLATES,High-Strength Low-Alloy
Aliquippa,Pa. J5 ..... 5.35
Bessemer,Ala. T2 ..... 5.35
Clairton,Pa. C3 ..... 5.35
Cleveland J5, R2 ..... 5.35
Conshohocken,Pa. A3 .. 5.35
Ecorse,Mich. G5 ..... 5.60
Fairfield,Ala. T2 ..... 5.35
Fontana,Calif. K1 ..... 5.95
Gary,Ind. C3 ..... 5.35
Geneva,Utah G1 ..... 5.35
Houston,Tex. S5 ..... 5.80
Ind.Harbor,Ind. I-2, Y1.. 5.35
Johnstown,Pa. B2 ..... 5.35
Munhall,Pa. C3 ..... 5.35
Pittsburgh J5 ..... 5.35
Sharon,Pa. S3 ..... 5.35
So. Chicago,Ill C3 ..... 5.35
SparrowsPoint,Md. B2 .. 5.35
Warren,O. R2 ..... 5.35
Youngstown Y1 ..... 5.35
PLATES, Ingot Iron
Ashland,ky.(15) A10 .... 3.75
Ashland,ky(15) A10 .... 4.25
Cleveland,cl R2 ..... 4.10
Warren,O.,cl R2 ..... 4.10
PLATES, Wrought Iron
Economy,Pa. B14 ..... 7.85

BARS, Hot-Rolled Carbon
AlabamaCity,Ala. R2 ... 3.45
Aliquippa,Pa. J5 ..... 3.45
Alton,Ill. (1) L1 ..... 3.35
Ashland,Ky.(17) A10 .. 3.45
Atlanta,Ga. A11 ..... 3.60
Bessemer,Ala. T2 ..... 3.45
Buffalo R2 ..... 3.45
Canton,O. R2 ..... 3.45
Clairton,Pa. C3 ..... 3.45
Cleveland R2 ..... 3.45
Ecorse,Mich. G5 ..... 3.65
Emeryville,Calif. J7 .... 4.10
Fairfield,Ala. T2 ..... 3.45
Fontana,Calif. K1 ..... 4.10
Gary,Ind. C3 ..... 3.45
Houston,Tex. S5 ..... 3.85
Ind.Harbor,Ind. I-2, Y1.. 3.45
Johnstown,Pa. B2 ..... 3.45
KansasCity,Mo. S5 ..... 4.05
Lackawanna,N.Y. B2 ... 3.45
LosAngeles B3 ..... 4.15
Marion,O. P11 ..... 3.35
Midland,Pa. C18 ..... 3.45
Milton,Pa. B6 ..... 3.45
Minnequa,Colo. C10 .... 3.85
Niles,Calif. P1 ..... 4.05
N.Tonawanda,N.Y. B11 .. 3.35
Pittsburg,Calif. C11 .... 4.15
Pittsburgh, J5 ..... 3.45
Porland,Oreg. O4 ..... 4.10
Seattle B3, N14 ..... 4.20
So.Chicago C3, R2 ..... 3.45
So.Chicago, Ill. W14... 3.45
So.Duquesne,Pa. C3 ... 3.45
S.SanFran.,Cal. B3 .... 4.20
Struthers,O. Y1 ..... 3.45
Torrance,Calif. C11 .... 4.15
Weirton,W.Va. W6 .... 3.45
Youngstown C3, R2 .. 3.45

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 ..... 3.45
Atlanta A11 ..... 3.60
Bethlehem,Pa.(2) B2 ... 3.65
Johnstown,Pa. B2 ..... 3.35
Lackawanna,N.Y. B2 ... 3.35
Niles,Calif. P1 ..... 4.05
Pittsburgh(23) J5 ..... 3.45
Portland,Oreg. O4 ..... 4.10
SanFrancisco S7 ..... 3.90
Weirton,W.Va. W6 .... 3.35

BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 ..... 3.95
Buffalo R2 ..... 3.95
Canton,O. R2 T7 ..... 3.95
Clairton,Pa. C3 ..... 3.95
Ecorse,Mich. G5 ..... 4.25
Fontana,Calif. K1 ..... 4.95
Gary,Ind. C3 ..... 3.95
Houston,Tex. S5 ..... 4.35
Ind.Harbor,Ind. I-2, Y1.. 3.95
Johnstown,Pa. B2 ..... 3.95
KansasCity,Mo. S5 ..... 4.55
Lackawanna,N.Y. B2 ... 3.95
LosAngeles B3 ..... 5.00
Massillon,O. R2 ..... 3.95
Midland,Pa. C18 ..... 3.95
So.Chicago C3, R2, W14.. 3.95
So.Duquesne,Pa. C3 .. 3.95
Struthers,O. Y1 ..... 3.95
Warren,O. C17 ..... 3.95
Youngstown C3 ..... 3.95

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. C3 ..... 4.20
Fontana,Calif. K1 ..... 4.95
Gary,Ind. C3 ..... 4.20
Youngstown C3 ..... 4.20

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy
Aliquippa,Pa. J5 ..... 5.20
Bessemer,Ala. T2 ..... 5.20
Bethlehem,Pa. B2 ..... 5.20
Clairton,Pa. C3 ..... 5.20
Cleveland R2 ..... 5.20
Ecorse,Mich. G5 ..... 5.40
Fairfield,Ala. T2 ..... 5.20
Fontana,Calif. K1 ..... 6.25
Gary,Ind. C3 ..... 5.20
Ind.Harbor,Ind. I-2, Y1.. 5.20
Johnstown,Pa. B2 ..... 5.20
Lackawanna,N.Y. B2 ... 5.20
Pittsburgh J5 ..... 5.20
So.Duquesne,Pa. C3 .. 5.20
Struthers,O. Y1 ..... 5.20
Youngstown C3 ..... 5.20
BARS, Cold-Finished Carbon
Aliquippa,Pa. K5 ..... 4.90
Ambridge,Pa. W18 .... 4.15
BeaverFalls,Pa. M12,R2.. 4.90
Buffalo B5 ..... 4.15
Camden,N.J. P13 ..... 4.63
Carnegie,Pa. C12 ..... 4.15
Chicago W18 ..... 4.15
Cleveland A7, C20..... 4.15
Cumberland,Md. C19 ... 3.95
Detroit P17 ..... 4.30
Donora,Pa. A7 ..... 4.15
Ecorse,Mich. G5 ..... 4.30
Elyria,O. W8 ..... 4.15
FranklinPark,Ill. N5 ..... 4.15
Gary,Ind. R2 ..... 4.15
Hammond,Ind. L2, M13.. 4.15
Hartford,Conn. R2 .... 4.55
Harvey,Ill. B5 ..... 4.15
LosAngeles R2 ..... 5.55
Mansfield,Mass. B5 .... 4.55
Massillon,O. R2, R8 ... 4.15
Midland,Pa. C18 ..... 4.00
Monaca,Pa. S17 ..... 4.15
Newark,N.J. W18 ..... 4.55
Plymouth,Mich. P5 .... 4.40
Pittsburgh J5 ..... 4.10
Putnam,Conn. W18 .... 4.55
Readville,Mass. C14 ... 4.55
St.Louis,Mo. M5 ..... 4.55
So.Chicago,Ill. W14 .... 4.15
SpringCity,Pa.(5) K3 .... 4.55
Struthers,O. Y1 ..... 4.15
Waukegan,Ill. A7 ..... 4.15
Youngstown F3 ..... 4.15
Youngstown Y1 ..... 4.15
BARS, Cold-Finished Alloy
Aliquippa,Pa. K5 ..... 4.90
Ambridge,Pa. W18 .... 4.90
BeaverFalls,Pa. M12 .... 4.90
Bethlehem,Pa. B2 ..... 4.90
Buffalo B5 ..... 4.90
Canton,O. R2, T7..... 4.90
Carnegie, Pa. C12 .... 4.90
Chicago W18 ..... 4.90
Cleveland A7, C20..... 4.65
Detroit P17 ..... 5.05
Donora,Pa. A7 ..... 4.65
Elyria,O. W8 ..... 4.65
Gary,Ind. R2 ..... 4.90
Hammond,Ind. L2 ..... 4.90
Hammond,Ind. M13 .... 4.90
Hartford,Conn. R2 .... 5.20
Harvey,Ill. B5 ..... 4.90
Lackawanna,N.Y. B2 .... 4.90
Mansfield,Mass. B5 .... 5.20
Massillon,O. R2, R8.... 4.90
Midland,Pa. C18 ..... 4.90
Monaca,Pa. S17 ..... 4.65
Newark, N. J. W18 .... 5.20
So.Chicago, Ill. R2 .... 4.90
So.Chicago,Ill. W14 .... 4.90
Struthers,O. Y1 ..... 4.65
Waukegan,Ill. A7 ..... 4.65
Warren,O. C17 ..... 4.90
Worcester,Mass. A7 .... 4.95
Youngstown Y1 ..... 4.65
Youngstown F3 ..... 4.90
BARS, Reinforcing (Fabricators)
AlabamaCity,Ala. R2 ... 3.45
Alton,Ill.(6) L1 ..... 3.35
Atlanta,Ga. A11 ..... 3.60
Buffalo R2 ..... 3.45
Cleveland R2 ..... 3.45
Emeryville,Calif. J7 .... 4.10
Fairfield,Ala. T2 ..... 3.45
Fontana,Calif. K1 ..... 4.10
Gary,Ind. C3 ..... 3.45
Houston,Tex. S5 ..... 3.85
Ind.Harbor,Ind. I-2, Y-1.. 3.45
Johnstown,Pa. B2 ..... 3.45
KansasCity,Mo. S5 ..... 4.05
Lackawanna,N.Y. B2 ... 3.45
LosAngeles B3 ..... 4.05
Minnequa,Colo. C10 .... 4.25
Niles,Calif. P1 ..... 4.05
Pittsburg,Calif. C11 .... 4.15
Pittsburgh J5 ..... 3.45
Portland,Oreg. O4 ..... 4.10
SandSprings,Okla. S5 .... 4.35
Seattle,Wash. B3, N14.. 4.20
So.Chicago,Ill R2 ..... 3.45
So.Duquesne,Pa. C3 .... 3.45
So.SanFrancisco B3 .... 4.10
SparrowsPoint,Md. B2 .. 3.45
Struthers,O. Y1 ..... 3.45
Torrance,Calif. C11 .... 4.15
Youngstown C3, R2 .... 3.45
BARS, Reinforcing (Fabricated; to Consumers)
Huntington,W.Va. W7 .. 4.50
Johnstown, ¼-1" B2 .... 4.25
LosAngeles B3 ..... 5.00
Marion,O. P11 ..... 4.25
Pittsburgh J5 ..... 4.35
Seattle B3, N14 ..... 5.10
So.SanFrancisco B3 .... 5.00
SparrowsPt., 1⅛-1¼" B2. 4.83
SparrowsPt., ¼-1" B2 .. 4.25
RAIL STEEL BARS
Chicagohts.,Ill.(3) I-2.. 3.30
ChicagoHts.,Ill.(4) I-2.. 3.45
FortWorth,Tex.(26) T4.. 4.33
Hntngtn,W.Va.(3) W7 .. 3.45
Moline,Ill.(3) R2 ..... 3.35
Williamsport(2,3) S19 .. 3.45
BARS, Wrought Iron
Economy,Pa.(S.R.) B14.9.50
Economy,Pa.(D.R.)B14 11.00
Economy(Stablt) B14..11.30
McK.Rks.(S.R.) L5 .... 8.60
McK.Rks.(D.R.) L5... 11.25
McK.Rks.(Staybolt) L5.12.75
BARS, Hot-Rolled Ingot Iron
Ashland,Ky. A10 ..... 3.70
SHEETS, Hot-Rolled Steel (18 gage and heavier)
AlabamaCity,Ala. R2 ... 3.35
Ashland,Ky.(8) A10 ... 3.35
Butler,Pa. A10 ..... 3.35
Cleveland J5, R2..... 3.35
Conshohocken,Pa. A3 .. 3.45
Ecorse,Mich.(8) G5 .... 3.55
Fairfield,Ala. T2 ..... 3.35
Fontana,Calif. K1 ..... 4.25
Gary,Ind. C3 ..... 3.35
Ind.Harbor,Ind. I-2, Y1.. 3.35
Irvin,Pa. C3 ..... 3.35
Lackawanna,N.Y. B2 ... 3.35
Munhall,Pa. C3 ..... 3.35
Niles,O. M4 ..... 3.75
Pittsburg,Calif. C11 .... 4.05
Pittsburgh J5 ..... 3.35
Sharon,Pa. S3 ..... 3.35
So.Chicago,Ill. W14 .... 3.35
SparrowsPoint,Md. B2 .. 3.35
Steubenville,O. W10 ... 3.35
Torrance,Calif. C11 .... 4.05
Warren,O. R2 ..... 3.35
Weirton,W.Va. W6 ..... 3.35
Youngstown C3, Y1 .... 3.35
SHEETS, Hot-Rolled Carbon Steel (19 gage and lighter)
AlabamaCity, Ala. R2 .. 4.50
Dover,O. R1 ..... 5.00
Ind.Harbor,Ind. I-2 .... 4.40
Mansfield,O. E6 ..... 4.15
Niles,O. N12 ..... 4.10
Niles,O. M4 ..... 4.65
Torrance, Calif. C11 .... 5.15
SHEETS, H-R (14 ga., heavier) High-Strength Low-Alloy
Cleveland J5, R2 ..... 5.05
Conshohocken,Pa. A3 .. 5.05
Ecorse,Mich. G5 ..... 5.25
Fairfield,Ala. T2 ..... 5.05
Fontana,Calif. K1 ..... 6.74
Gary,Ind. C3 ..... 5.05
Ind.Harbor,Ind. I-2, Y1.. 5.05
Irvin,Pa. C3 ..... 5.05
Lackawanna,N.Y. B2 .. 5.05
Pittsburgh J5 ..... 5.05
Sharon,Pa. S3 ..... 5.05
So.Chicago,Ill. C3 .... 5.05
SparrowsPoint,Md. B2 .. 5.05
Warren,O. R2 ..... 5.05
Weirton,W.Va. W6 .... 5.05
Youngstown C3, Y1..... 5.05
SHEETS, Cold-Rolled High-Strength Low-Alloy
Cleveland J5, R2 ..... 6.20
Ecorse,Mich. G5 ..... 6.40
Fontana,Calif. K1 ..... 7.10
Gary,Ind. C3 ..... 6.20
Ind.Harbor,Ind. I-2, Y1.. 6.20
Irvin,Pa. C3 ..... 6.20
Lackawanna,N.Y. B2 .... 6.20
Pittsburgh J5 ..... 6.20
Sharon,Pa. S3 ..... 6.30
SparrowsPoint,Md. B2 .. 6.20
Warren,O. R2 ..... 6.20
Weirton,W.Va. W6 .... 6.20
Youngstown Y1 ..... 6.20

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SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10	4.10
Cleveland J5, R2	4.10
Ecorse,Mich. G5	4.30
Fairfield,Ala. T2	4.10
Follansbee,W.Va. F4	4.10
Fontana,Calif. K1	5.00
Gary,Ind. C3	4.10
GraniteCity,Ill. G4	4.30
Ind.Harbor,Ind. I-2, Y1	4.10
Irvin,Pa. C3	4.10
Lackawanna,N.Y. B2	4.10
Middletown,O. A10	4.10
Pittsburg,Calif. C11	5.05
Pittsburgh J5	4.10
SparrowsPoint,Md. B2	4.10
Steubenvill,O. W10	4.10
Warren,O. R2	4.10
Weirton,W.Va. W6	4.10
Youngstown Y1	4.10

SHEETS, Gal'zd No. 10 Steel

AlabamaCity, Ala. R2	4.40
Ashland,Ky.(8) A10	4.40
Canton,O. R2	4.40
Delphos,O. N16	5.15
Dover,O. R1	5.65
Fairfield,Ala. T2	4.40
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Kokomo,Ind. C16	4.50
MartinsFerry,O W10	4.40
Niles,O. N12	*4.65*
Pittsburg,Calif. C11	5.15
SparrowsPoint,Md. B2	4.40
Steubenville,O. W10	4.40
Torrance,Calif. C11	5.15
Weirton,W.Va. W6	4.40

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. C3	6.75
SparrowsPoint,Md. B2	6.75

SHEETS, Galvannealed Steel

Canton,O. R2	4.95
Irvin,Pa. C3	4.95
Kokomo,Ind. C16	5.05
Niles,O. N12	*5.20*

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10	4.65
Middletown,O. A10	4.65

SHEETS, Electro Galvanized

Cleveland R2 (28)	5.25
Niles,O. R2 (28)	5.25
Weirton,W.Va. W6	5.10

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.05

SHEETS, Culvert, No. 16

	Cu Alloy	Cu Fe
Ashland A10	5.20	...
Canton,O. R2	5.25	5.70
Fairfield,Ala. T-2	5.20	5.45
Gary C3	5.20	5.45
GraniteCity G4	5.40	5.70
IndianaHarbor I-2	5.20	5.45
Irvin C3	5.20	5.45
Kokomo C16	5.40	...
MartinsFy,O. W10	5.20	5.45
Pittsburg,Cal. C11	5.95	...
SparrowsPt, B2	5.20	...
Torrance,Cal. C11	5.95	...

SHEETS, Culvert, No. 16 Corrugated Ingot Iron

Ashland,Ky. A10	5.45

SHEETS, Well Casing

Torrance,Calif. C11	4.85
Youngstown C3	3.85

SHEETS, Drum Body

Pittsburg,Calif. C11	3.95
Torrance,Calif. C11	3.95

SHEETS, ALUMINIZED

Butler,Pa. A10	7.75

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBotm, W.Va. W10	4.80
Gary,Ind. C3	4.80
Mansfield,O. E6	4.80
Middletown,O. A10	4.80
Weirton,W.Va. W6	4.80

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.20

ROOFING SHORT TERNES (Package; 8 lb coated)

Gary,Ind. C3	$17.50
Yorkville,O. W10	17.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	$6.60
Gary,Ind. C3	6.50
Ind.Harbor I-2	6.50
Irvin,Pa. C3	6.50
Weirton,W.Va. W6	6.50
Yorkville,O. W10	6.50

SHEETS, Lt. Coated Ternes, 6 lb

Yorkville,O. W10	$7.20

SHEETS, Mfg. Ternes, 8 lb

Gary,Ind. C3	$8.10
Yorkville,O. W10	8.10

SHEETS, Coated Ternes, 12 lb

Yorkville,O. W10	8.95

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland,Ky.(8) A10	3.60
Cleveland R2	3.95
Ind.Harbor,Ind. I-2	3.60
Warren,O. R2	3.95

SHEETS, Cold-Rolled Ingot Iron

Cleveland R-2	4.70
Middletown,O. A10	4.60
Warren,O. R2	4.70

SHEETS, Galvanized Ingot Iron No. 10 Flat

Ashland,Ky.(8) A10	4.65
Canton,O. R2	5.15

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10	4.90
Middletown,O. A10	4.90

HOLLOWARE ENAMELING Black Plate (29 gage)

Aliquippa,Pa. J5	5.30
Follansbee,W.Va. F4	5.30
Gary,Ind. C3	5.30
GraniteCity,Ill. G4	5.50
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. C3	5.30
Niles,O. R2	5.30
SparrowsPoint,Md. B2	5.40
Warren,O. R2	5.30
Yorkville,O. W10	5.30

SHEETS, Enam'lg. Iron

Ashland,Ky.(8) A10	4.40
Cleveland R2	4.40
Ecorse,Mich. G5	4.70
Gary,Ind. C3	4.40
GraniteCity,Ill. G4	4.60
Ind.Harbor,Ind. I-2	4.40
Irvin,Pa. C3	4.40
Middletown,O. A10	4.40
Niles,O. M4	4.90
Youngstown Y1	4.40

CANMAKING BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$5.60
Fairfield,Ala. T2	5.70
Gary,Ind. C3	5.60
GraniteCity,Ill. G4	5.80
Ind.Harbor,Ind. I-2, Y1	5.60
Irvin,Pa. C3	5.60
Niles,O. R2	5.60
Pittsburg,Calif. C11	6.35
SparrowsPoint,Md. B2	5.70
Warren,O. R2	5.60
Weirton,W.Va. W6	5.60
Yorkville,O. W10	5.60

TIN PLATE, American Coke (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$7 30	$7.50
Fairfield,Ala. T2.	7.40	7.60
Gary C3	7.30	7.50
Gran.City,Ill. G4.	7.50	7.70
Ind.Harb. I-1, Y1	7.30	7.50
Irvin,Pa. C3	7.30	7.50
Pitts.Cal. C11	8.05	8.25
Sp.Pt.,Md. B2	7.30	7.50
Warren R2	7.30	7.50
Weirton W6	7.30	7.50
Yorkville,O. W10.	7.30	7.50

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	3.50
Warren,O. R2	*3.85*

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	4.75

STRIP, Hot-Rolled Carbon

Alton,Ill. (1) L1	3.25
Ashland,Ky.(8) A10	3.25
Atlanta A11	3.40
Bessemer,Ala. T2	3.25
Bridgeprt,Conn.(10) S15.	3.25
Butler,Pa. A10	3.25
Carnegie,Pa. S18	3.25
Conshohocken,Pa. A3	3.35
Detroit M1	3.55
Ecorse,Mich. G5	3.45
Fairfield,Ala. T2	3.25
Fontana,Calif. K1	4.40
Gary,Ind. C3	3.25
Houston,Tex. S5	3.65
Ind.Harbor,Ind. I-2, Y1.	3.25
KansasCity,Mo. S5	3.85
Lackawanna,N.Y. B2	3.25
LosAngeles B3	4.00
Milton,Pa. B6	3.25
Minnequa,Colo. C10	4.30
NewBritain(10) S15	3.25
N.Tonawanda,N.Y. B11	3.30
Pittsburg,Calif. C11	4.00
Riverdale,Ill. A1	3.25
SanFrancisco S7	3.90
Seattle B3, N14	4.25
Sharon,Pa. S3	3.25
So.Chicago,Ill. W14	3.25
So.SanFrancisco B3	4.00
SparrowsPoint,Md. B2.	3.25
Torrance,Calif. C11	4.00
Warren,O. R2	3.25
Weirton,W.Va. W6	3.25
WestLeechburg,Pa. A4	3.25
Youngstown C3 Y1	3.25

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15.	5.10
Carnegie,Pa. S18	5.10
Fontana,Calif. K1	6.30
Gary,Ind. C3	5.10
Houston,Tex. S5	5.50
KansasCity,Mo. S5	5.70
NewBritn,Conn.(10) S15.	5.10
Sharon,Pa. S3	5.10
Youngstown C3	5.10

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10) S15.	9.50
Carnegie,Pa. S18	9.50
Cleveland A7	9.50
Dover,O. G6	9.50
Harrison,N.J. C18	9.80
NewBritn,Conn.(10) S15.	9.50
Pawtucket,R.I.(11) N8.	9.50
Pawtucket,R.I.(12) N8.	9.80
Sharon,Pa. S3	9.50
Worcester,Mass. A7	9.80
Youngstown C8	9.50

STRIP, Cold-Rolled Carbon

Berea,O. C7	6.10
Bridgeprt,Conn.(10) S15.	4.15
Butler,Pa. A10	4.15
Cleveland A7, J5	4.15
Dearborn,Mich. D3	4.40
Detroit, D2	4.40
Detroit M1	4.35
Dover, O. G6	4.15
Ecorse,Mich. G5	4.35
Follansbee,W.Va. F4	4.15
Fontana,Calif. K1	5.40
FranklinPark,Ill. T6	4.30
Ind.Harbor,Ind. I-2	4.30
Lackawanna,N.Y. B2	4.15
LosAngeles C1	5.50
Mattapan,Mass.(21) T6	4.50
Middletown,O. A10	4.15
NewBritain(10) S15	4.00
NewCastle,Pa. B4, E5.	4.15
NewHaven,Conn. A7, D2.	4.65
NewKensington,Pa. A6.	4.00
NewYork W3	5.00
Pawtucket,R.I.(11) N8.	4.70
Pawtucket,R.I.(21) N8.	4.65
Riverdale,Ill. A1	4.30
Sharon,Pa.(30) S3	4.15
SparrowsPoint,Md. B2	4.15
Trenton,N.J.(13) R5	4.65
Wallingford,Conn. W2	4.65
Warren,O.(25) T5	4.15
Warren,O. R2	4.15
Weirton,W.Va. W6	4.15
Youngstown Y1	4.15
Youngstown C8	*4.15*

STRIP, Cold-Rolled, High-Strength Low-Alloy

Cleveland A7, J5	6.20
Dover,O. G6	6.20
Ecorse,Mich. G5	6.40
Fontana,Calif. K1	6.95
Lackawanna,N.Y. B2.	6.05
Pittsburgh, J5	6.20
Sharon,Pa. S3	*6.20*
SparrowsPoint,Md. B2	6.05
Warren,O. R2	6.20
Weirton,W.Va. W6	6.20
Youngstown Y1	6.05

STRIP, Electro Galvanized

Weirton,W.Va. W6	4.15
Youngstown C8	*4.15*

STRIP, Cold-Finished, Spring Steel (Annealed)

	0.25-0.40C	0.40-0.60C	0.60-0.80C	0.80-1.05C	1.05-1.35C
Bridgeprt,Conn.(10) S15	4.00	5.50	6.10	8.05	10.35
Bristol,Conn. W1	...	...	6.40	8.35	....
Carnegie,Pa. S18	...	5.50	6.10	8.05	10.35
Cleveland A7	*4.15*	*5.95*	*6.55*	*8.50*	*10.80*
Dover,O. G6	4.00	5.50	6.10	7.85	10.15
FranklinPark,Ill. T6	*4.40*	*6.10*	*6.70*	*8.65*	
Harrison,N.J. C18	...	...	6.40	8.35	10.65
Mattapan,Mass. T6	4.50	5.80	6.40	8.35	10.65
NewBritn.,Conn(10) S15	4.00	5.50	6.10	8.05	10.35
NewCastle,Pa. B4	4.00	5.50	6.10	8.05	....
NewCastle,Pa. E5	4.00	5.50	6.10	8.05	10.35
NewYork W3	...	5.80	6.40	8.35	10.65
Pawtucket,R.I. N8:					
Cleve.orPitts.Base (29)	4.55	5.50	6.10	8.05	10.35
Worcester,Mass.Base(29)	4.50	5.80	6.40	8.35	10.65
Sharon,Pa. S3	*4.15*	*5.95*	*6.55*	*8.50*	*10.80*
Trenton,N.J. R5	...	6.30	6.90	8.85	11.15
Union,N.J. H6	4.40	6.35	6.35	8.30	10.50
Wallingford,Conn. W2	4.50	5.80	6.40	8.05	10.35
Weirton,W.Va. W6	4.15	5.95	6.55	8.50	10.80
Worcester,Mass. A7	*4.45*	*6.25*	*6.85*	*8.80*	*11.10*
Worcester,Mass. T6	4.50	5.80	6.40	8.35	10.65
Youngstown C8	4.50	5.50	6.10	8.05	10.35

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$6.35	$6.60	$6.85
Fairfield,Ala. T2	6.45	6.70	6.95
Gary,Ind. C3	6.35	6.60	6.85
GraniteCity,Ill. G4	*6.55*	*6.80*	*7.05*
Ind.Harbor,Ind. I-2, Y1	6.35	6.60	6.85
Irvin,Pa. C3	6.35	6.60	6.85
Niles,O. R2	6.35	6.60	6.85
Pittsburg,Calif. C11	7.10	7.35	7.60
SparrowsPoint,Md. B2	6.45	6.70	6.95
Weirton,W.Va. W6	6.35	6.60	6.85
Yorkville,O. W10	6.35	6.60	6.85

SHEETS, SILICON (22 Gage Base) Coils (Cut Lengths ½c lower)

	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	...	6.95	7.45	8.45	9.25
Brackenridge,Pa. A4	...	...	7.45	8.45	9.25
Follansbee,W.Va. F4	...	...	7.45	8.45	9.25
Toronto,O. F4	...	...	7.45	8.45	9.25
Vandergrift,Pa. C3	...	6.95	7.45	8.45	9.25
Warren,O. R2	...	6.95	7.45	8.45	...
Zanesville,O. A10	...	...	7.45	8.45	9.25

SHEETS, SILICON (24 Ga. Base)

GraniteCity,Ill. G4	...	...	7.15	8.15	...
Ind.Harbor,Ind. I-2 (cut lgths)	5.90	6.20	6.70	...	...
Ind.Harbor,Ind. I-2 (Coils)	6.40	6.70	...	...	...
Mansfield,O. E6	5.15	5.45	5.95	6.70	...
Niles,O. M4	5.65	5.95	6.45	...	...
Niles,O. N12	...	6.45	6.95	...	...

COILS—COLD-REDUCED, SILICON

Warren,O. R2	6.65	6.95	7.45	8.45	9.25

SHEETS, SILICON (22 Gage Base) Coils (Cut Lengths ½c lower)

Transformer Grade	72	65	58	52
BeechBottom,W.Va. W10	9.80	10.35	11.05	11.85
Brackenridge,Pa. A4	9.80	10.35	11.05	....
Follansbee,W.Va. F4	9.80	10.35	11.05	11.85
Toronto,O. F4	9.80	10.35	11.05	11.85
Vandergrift,Pa. C3	9.80	10.35	11.05	11.85
Warren,O. R2	9.80	....	....	....
Zanesville,O. A10	9.80	10.35	11.05	11.85

COLD-REDUCED COILS AND CUT LENGTHS, SILICON

	72	T-100	T-90	T-80
Vandergrift,Pa. C3 (22 Ga.)	...	12.35	13.60	14.85

Key to Producing Companies

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A6 American Shim Steel Co.
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Bolardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B14 A. M. Byers Co.

C1 Calif. Cold-Rolled Steel
C3 Carnegie-Illinois Steel
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Clev. Cld.Roll.MillsCo.
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Col. Steel & Shafting Co.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Co.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F6 Fretz-Moon Tube Co.

G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H4 Heppenstall Co.
H6 Hind Steel Co. Inc.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K5 Kidd Drawn Steel Co.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

STRIP, Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2	4.95
Conshohocken,Pa. A3	4.95
Ecorse,Mich. G5	5.15
Fairfield,Ala. T2	4.95
Fontana,Cal. K1	6.64
Gary, Ind. C3	4.95
Ind.Harb.,Ind. I-2, Y1	4.95
Lackawanna,N.Y. B2	4.95
Sharon,Pa. S3	4.95
SparrowsPoint,Md. B2	4.95
Warren,O. R2	4.95
Weirton,W.Va. W6	4.95
Youngstown C3, Y1	4.95

TIGHT COOPERAGE HOOP

Atlanta A11	3.60
Riverdale,Ill. A1	3.60
Sharon,Pa. S3	3.60
Youngstown C3	3.60

WIRE, Cold-Rolled Flat

Cleveland A7	5.35
Dover,O. G6	5.15
Fostoria,O. S1	5.50
Kokomo,Ind. C16	5.00
FranklinPark,Ill. T6	*5.70*
Massillon,O. R8	5.35
Monessen,Pa. P7	*5.35*
Pawtucket,R.I.(11) N8	5.70
Pawtucket,R.I.(12) N8	5.65
Trenton,N.J. R5	5.65
Worcester,Mass. A7	5.65
Worcester,Mass. T6	5.30

WIRE, Fine and Weaving (8-in. Coils)

Bartonville,Ill.(1) K4	7.70
Buffalo W12	*8.45*
Chicago W13	*8.45*
Cleveland A7	8.05
Crawfrdsvil,Ind. M8	*8.60*
Fostoria,O. S1	8.20
Johnstown,Pa. B2	7.70
Kokomo,Ind. C16	7.70
Palmer,Mass. W12	*8.75*
Portsmouth,O. P12	*8.45*
Trenton,N.J. R5	8.75
Waukegan,Ill. A7	8.05
Worcester,Mass. T6	8.00
Worcester,Mass. A7	8.35

WIRE (16 gage)	An'ld. Galv. Stone	Stone
Aliquippa J5	*9.40*	*10.90*
Bartonville(1) K4	9.05	10.55
Cleveland A7	*9.80*	*11.30*
Crawfrdsvil M8	*9.95*	*11.45*
Fostoria,O. S1	9.65	11.15
Johnstown B2	9.80	11.30
Kokomo C16	9.60	10.90
Minnequa C10	9.40	10.90
Palmer,Mass. W12	9.35	10.85
Pitts.,Cal. C11	9.75	11.25
Prtsmth.(18) P12	*9.80*	*11.30*
SparrowsPt. B2	9.90	11.40
Waukegan A7	*9.80*	*11.30*

WIRE, Manufacturers Bright, Low-Carbon

AlabamaCity, Ala. R2	4.50
Aliquippa,Pa. J5	4.50
Atlanta A11	4.60
Alton,Ill.(1) L1	4.15
Bartonville,Ill.(1) K4	4.50
Buffalo W12	*4.50*
Chicago W13	*4.50*
Cleveland C20	4.15
Cleveland A7	4.50
Crawfrdsvil,Ind. M8	*4.65*
Donora,Pa. A7	4.50
Duluth A7	4.50
Fairfield,Ala. T2	4.50
Fostoria,O.(24) S1	4.65
Houston S5	*4.90*
Johnstown,Pa. B2	4.50
Joliet,Ill. A7	4.50
KansasCity,Mo. S5	*5.10*
Kokomo,Ind. C16	4.60
LosAngeles B3	5.10
Minnequa,Colo. C10	4.50
Monessen,Pa. P7	4.50
Newark,6-8ga. I-1	*5.15*
No.Tonawanda B11	4.18
Palmer,Mass. W12	*4.50*
Pittsburg,Calif. C11	5.45
Portsmouth,O. P12	*4.50*
Rankin,Pa. A7	4.50
So.Chicago,Ill. R2	4.50
So.SanFrancisco C10	5.10
SparrowsPoint,Md. B2	4.60
Sterling,Ill.(1) N15	4.50
Struthers,O. Y1	4.50
Torrance,Calif. C11	5.45
Waukegan,Ill. A7	4.50
Worcester,Mass. T6	4.45
Worcester,Mass. A7	4.80

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	5.90
Alton,Ill(1) L1	5.55
Bartonville,Ill.(1) K4	5.90
Buffalo W12	*5.90*
Cleveland A7	5.55
Donora,Pa. A7	5.55
Duluth A7	5.55
Fostoria,O. S1	6.05
Johnstown,Pa. B2	5.90
LosAngeles B3	6.50
Milbury,Mass.(12) N6	6.20
Monessen,Pa. P7	5.90
Palmer,Mass. W12	*6.20*
Pittsburg,Calif. C11	6.85
Portsmouth,O. P12	*5.90*
So.Chicago,Ill. R2	5.90
SparrowsPoint,Md. B2	6.00
Struthers,O. Y1	5.90
Trenton,N.J. A7	5.85
Trenton,N.J. R5	6.20
Waukegan,Ill. A7	5.55
Worcester A7, J4, T6	5.85
Worcester,Mass. W12	*6.20*

ROPE WIRE	Mild Plow	Plow	Imp. Plow
Bartonville,Ill. K4	8.05	8.05	8.30
Buffalo W12	7.50	7.80	8.20
Cleveland A7	*8.05*	*8.05*	*8.30*
Donora,Pa. A7	*8.05*	*8.05*	*8.30*
Fostoria,O. S1	8.00	8.30	8.70
Johnstown,Pa. B2	7.50	7.80	8.20
Monessen,Pa. P7	*8.05*	*8.05*	*8.30*
NewHaven,Conn. A7	*8.35*	*8.35*	*8.60*
Palmer,Mass. W12	7.80	8.10	8.50
Portsmouth,O. P12	*8.05*	*8.05*	*8.30*
SparrowsPoint,Md. B2	7.60	7.90	8.30
Struthers,O. Y1	*8.05*	*8.05*	*8.30*
Trenton,N.J. A7	8.35	8.35	8.60
Trenton,N.J. R5	*8.05*	*8.05*	*8.30*
Waukegan,Ill. A7	*8.05*	*8.05*	*8.30*
Williamsport,Pa. B2	7.60	7.90	8.30
Worcester, Mass. J4	7.70	8.10	8.50

WIRE, Merchant Quality (6 to 8 gage)

	An'ld	Galv.
Ala.City, R2	5.35	5.60
Aliquippa J5	5.35	5.60
Atlanta A11	5.25	5.70
Bartnville(19) K4	5.35	5.60
Buffalo(31) W12	*4.50*	
Cleveland A7	5.15	5.60
Donora A7	*5.35*	*5.60*
Duluth A7	5.15	5.60
Fairfield T2	5.15	5.60
Crawfrdvil. M8	*5.50*	*5.75*
Houston,Tex. S5	*5.75*	*6.00*
Johnstown B2	5.35	5.60
Joliet,Ill. A7	5.15	5.60
KansasCity,Mo. S5	*5.95*	*6.20*
Kokomo C16	5.25	5.70
LosAngeles B3	5.75	
Minnequa C10	5.15	5.60
Monessen P7	5.35	5.60
Palmer(31) W12	*4.80*	
Pitts.,Cal. C11	6.10	6.55
Portsmth.(18) P12	*5.35*	*5.60*
Rankin A7	5.15	5.60
So.Chicago R2	5.35	5.60
So.S.Fran. C10	5.75	6.20
SparrowsPt. B2	5.45	5.70
Sterling,Ill.(1)N15	5.35	5.60
Struthers,O. Y1	5.35	5.60
Torrance,Cal. C11	6.10	
Worcester A7	5.45	5.90

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.55
Alton,Ill.(1) L1	5.20
Buffalo W12	*5.30*
Cleveland A7	5.55
Donora,Pa. A7	5.55
Duluth A7	5.55
Johnstown,Pa. B2	5.55
Los Angeles B3	6.15
Monessen P7	5.55
NewHaven,Conn. A7	5.85
Palmer,Mass. W12	*5.60*
Pittsburg,Calif. C11	6.50
Portsmouth,O. P12	*5.55*
So.Chicago,Ill. R2	5.55
SparrowsPoint,Md. B2	5.65
Struthers,O. Y1	5.55
Torrance,Calif. C11	6.50
Trenton,N.J., A7, R5	5.85
Waukegan,Ill. A7	5.55
Worcester,Mass. A7	5.85

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	126
Aliquippa,Pa. J5	126
Atlanta A11	128
Bartonville,Ill.(19) K4	126
Crawfordsville M8	*129*
Donora,Pa. A7	126
Duluth,Minn. A7	126
Fairfield,Ala. T2	126
Houston,Tex. S5	*134*
Johnstown,Pa. B2	126
Joliet,Ill. A7	126
KansasCity,Mo. S5	*138*
Kokomo,Ind. C16	128
Minnequa,Colo. C10	130
Monessen,Pa. P7	126
Pittsburg,Calif. C11	146
Portsmouth,O.(18) P12	*126*
Rankin,Pa. A7	126
So.Chicago,Ill. R2	126
So.SanFran.,Calif. C10	143
SparrowsPoint,Md. B2	128
Sterling,Ill.(1) N15	126

FENCE POSTS

	Col.
Duluth A7	112
Huntington,W.Va. W7	112
Johnstown,Pa. B2	112
Joliet,Ill. A7	112
Minnequa,Colo. C10	120
Moline,Ill. R2	116
Williamspt,Pa. S19	n.t.$120

WOVEN FENCE, 9-15½ gage

	Col.
Ala.City,Ala.,17-18ga. R2	198
AlabamaCity,Ala. R2	116
Aliquip.,Pa.9-14½ga. J5	116
Atlanta A11	118
Bartonville,Ill.(19) K4	116
Crawfordsvil,Ind. M8	*119*
Donora,Pa. A7	116
Duluth A7	116
Houston,Tex. S5	*124*
Fairfield,Ala. T2	116
Johnstown,Pa. B2	116
Johnstn,17ga.,6" B2	190
Johnstn,17ga.,4" B2	193
Joliet,Ill. A7	116
KansasCity,Mo. S5	*128*
Kokomo,Ind. C16	118
Minnequa,Colo. C10	116
Monessen,Pa. P7	116
Pittsburg,Calif. C11	139
Portsmouth,O.(18) P12	*116*
Rankin,Pa. A7	116
So.Chicago,Ill. R2	116
Sterling,Ill.(1) N15	116

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	113
Atlanta A11	114
Bartonville,Ill.(19) K4	113
Chicago W13	*113*
Crawfordsville M8	*116*
Donora,Pa. A7	113
Duluth A7	113
Fairfield,Ala. T2	113
Joliet,Ill. A7	113
KansasCity,Mo. S5	*125*
Kokomo,Ind. C16	115
Minnequa,Colo. C10	113
Pittsburg,Calif. C11	137
Portsmouth,O.(18) P12	*113*
So.Chicago,Ill. R2	113
So.SanFran.,Calif. C10	130
SparrowsPoint,Md. B2	108
Sterling,Ill.(1) N15	113

NAILS & STAPLES, Stock To Dealers & Mfrs. (7)

	Col.
AlabamaCity,Ala. R2	106
Aliquippa,Pa. J5	106
Atlanta A11	108
Bartonville,Ill.(19) K4	106
Chicago,Ill. W13	*106*
Cleveland A9	112
Crawfordsville M8	*109*
Donora,Pa. A7	106
Duluth A7	106
Fairfield,Ala. T2	106
Galveston,Tex. D7	*114*
Houston,Tex. S5	*114*
Johnstown,Pa. B2	106
Joliet,Ill. A7	106
KansasCity,Mo. S5	*118*
Kokomo,Ind. C16	108
Minnequa,Colo. C10	110
Monessen,Pa. P7	106
Pittsburg,Calif. C11	125
Portsmouth,O. P12	*106*
Rankin,Pa. A7	106
So.Chicago,Ill. R2	106
SparrowsPoint,Md. B2	108
Sterling,Ill.(1) N15	106
Torrance,Calif. C11	126
Worcester,Mass. A7	112

RAILS	Std. No. 1	Std. No. 2	Std. All No. 2	TeeRails 60 lb Under
Bessemer,Pa. C3	3.40	3.30	3.35	3.75
Ensley,Ala. T2	3.40	3.30	...	3.75
Fairfield,Ala. T2	...	...	...	3.75
Gary,Ind. C3	3.40	3.30	3.35	...
Ind.Harbor,Ind. I-2	3.40	3.30	3.35	...
Johnstown,Pa. B2	...	...	...(16)	3.75
Lackawanna B2	3.40	3.30	...	3.75
Minnequa,Colo. C10	3.40	3.30	...	4.25
Steelton,Pa. B2	3.40	3.30	...	...

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2	5.35
Bartonville,Ill.(19) K4	5.35
Crawfrdsvil, Ind. M8	*5.50*
Donora,Pa. A7	5.35
Duluth A7	5.35
Johnstown, Pa. B2	5.35
Joliet,Ill. A7	5.35
Kokomo,Ind. C16	5.45
Minnequa,Colo. C10	5.55
Pittsburg,Calif. C11	6.30
Portsmouth,O. P12	*5.35*
Rankin,Pa. A7	5.35
So.Chicago,Ill. R2	5.35
SparrowsPoint,Md. B2	5.45
Worcester,Mass. A7	5.65

NAILS, Cut (100 lb keg)

Conshohocken,Pa. A3	$6.75
Wheeling,W.Va. W10	6.75

AXLES

Fairfield,Ala. T2	5.25
Gary,Ind. C3	5.25
Ind.Harbor,Ind. S13	5.25
Johnstown,Pa. B2	5.20
McKeesRocks,Pa. C3	5.25

TIE PLATES

Fairfield,Ala. T2	4.20
Gary,Ind. C3	4.20
Ind.Harbor,Ind. I-2	4.20
Lackawanna,N.Y. B2	4.20
Minnequa,Colo. C10	4.05
Pittsburg,Calif. C11	4.35
Pittsburgh R2	4.20
Seattle B3	4.65
Steelton,Pa. B2	4.20
Torrance,Calif. C11	4.35
Weirton,W.Va. W6	4.05

JOINT BARS

Bessemer,Pa. C3	4.40
Fairfield,Ala. T2	4.40
Ind.Harbor,Ind. I-2	4.40
Joliet,Ill. C3	4.40
Lackawanna,N.Y. B2	4.40
Minnequa,Colo. C10	4.25
Steelton,Pa. B2	4.40

TRACK BOLTS (20) Treated

Fairfield,Ala. T2	8.50
Lebanon,Pa. B2	8.50
Minnequa,Colo. C10	8.25
Pittsburgh,Pa. O3, P14	*9.10*

STANDARD TRACK SPIKES

Fairfield,Ala. T2	5.35
Ind.Harbor,Ind. I-2, Y1	5.35
KansasCity,Mo. S5	5.60
Lebanon,Pa. B2	5.60
Minnequa,Colo. C10	5.35
Pittsburgh J5	*5.60*
So.Chicago,Ill. R2	5.35
Struthers,O. Y1	5.35
Youngstown R2	5.35

LIGHT RAILS, Rail Steel

Huntington,W.Va. W7	3.75

Key to Producing Companies

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M10 Missouri-Illinois Furnace
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.
N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 New EngHighCarb.Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll.Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills
P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R7 Rotary Electric Steel Co.
R8 Reliance Div.,Eaton Mfg.
S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S7 Simmonds Co.
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod.& Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
U4 Universal Cyclops Steel
V2 Vanadium Alloys Steel
V3 Vulcan Crucible Steel Co.
W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washingon Steel Corp.
W6 Weirton Steel Corp.
W7 W. Va. Steel & Mfg. Co.
W8 Wstrn.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W16 Worth Steel Co.
W18 Wyckoff Steel Co.
Y1 Youngstwn Sheet & Tube

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	21.00	18W,4Cr,3V	126.00
Extra Carbon	24.50	18W,4Cr,2V,9Co	185.50
Spec. Carbon	29.50	18W,4Cr,2V,6Co	169.50
Oil Hardening	32.00	18.25W,4.25Cr,1V,4.75Co	156.50
Cr Hot Wrk.	32.00	20.25W,4.25Cr,1.6V,12.25Co	293.50
Hi-Carbon-Cr	57.50	1.5W,4Cr,1V,8.5Mo	71.50
18W,4Cr,1V	100.00	6.4W,4.5Cr,1.9V,5Mo	76.50
18W,4Cr,2V	113.00	6W,4Cr,3V,6Mo	97.00

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M9, M14, R2, S8, T7, U4, V2, V3.

(1) Chicago Base. (2) Angles. (3) Merchant. (4) Reinforcing. (5) Philadelphia del. (6) Chicago or Birm. Base. (7) To jobbers, 3 cols. lower. (8) 16 gage and heavier. (9) 6 in. and narrower. (10) Pittsburgh Base. (11) Cleveland & Pittsburgh Base (12) Worcester, Mass. Base. (13) 3" & wider; over ½" to under 3" 5.15c. (14) Also wide flange beams. (15) ½" and thinner. (16) 40 lb and under. (17) Flats only. (18) To dealers. (19) Chicago & Pittsburgh Base. (20) Deduct 0.25c for untreated. (21) New Haven, Conn. Base. (22) Del. San Fran. Bay area. (23) Angles 1"x1" to 1¼"x1¼" only. (24) Deduct 0.35c for finer than 15 Ga. (25) Up to 0.035 C; 4.40c, 0.035 C and over. (26) Reinforcing, mill shipments; to consumers, 4.83c; fabricated to fabricators, 4.58c. (27) 22 Gage; hot or cold-reduced. (28) Bonderized. (29) 0.25-0.40C. (30) 0.40 C and less. (31) Not annealed.

UNIVERSITY OF MICHIGAN LIBRARIES

STANDARD PIPE, T. & C.

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % —Black— A	B	C	—Galvanized— D	E	F
⅛	5.5c	0.24	36.5	34.5	...	8.5	9	...
¼	6.0	0.42	33.5	31.5	...	9.5	11	...
⅜	6.0	0.57	29	27	...	5.5	8	...
½	8.5	0.85	40.5	38.5	39.5	24.0	22.0	23.0
¾	11.5	1.13	43.5	41.5	42.5	28.0	26.0	27.0
1	17.0	1.68	46.0	44.0	45.0	31.0	29.0	30.0
1¼	23.0	2.28	46.5	44.5	45.5	31.5	29.5	30.5
1½	27.5	2.73	47.0	45.0	46.0	32.0	30	31.0
2	37.0	3.68	47.5	45.5	46.5	32.5	30.5	31.5
2½	58.5	5.82	48.0	46.0	47.0	33.0	31.0	32.0
3	76.5	7.62	48.0	46.0	47.0	33.0	31.0	32.0

Column A: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 1½ percentage points lower on ⅛", 2 points lower on ¼", 3 points lower on ⅜", W10. Wheatland, Pa., 2 pts lower on ⅛" through ⅜", W9. Following make ½" and larger: Lorain, O. N3; Youngstown, plus 42% on 3½" and 4", R2; Youngstown Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11 points lower on ⅛" and larger continuous weld and 31% on 3½" and 4".

Columns B & E: Sparrows Point Md. B2.

Columns C & F: Indiana Harbor, Ind., ½" through 3", Y1.

Column D: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa., ⅛" through ⅜", F6; Benwood, W. Va., except 3½ points lower on ⅛", 2½ pts on ¼", 3 pts on ⅜" W10. Wheatland, Pa., except 2 pts lower on ⅛" through ⅜", W9. Following make ½" and larger: Lorain N3; Youngstown, plus 26.5% on 3½" and 4", R2; Youngstown, Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11 points lower on ½" and larger continuous weld and 15.5% on 3½" and 4".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % —Seamless— Black A	Galv. B	—Elec. Weld— Black C	Galv. D
2	37.0c	3.68	36.0	20.5	36.0	20.5
2½	58.5	5.82	39.0	23.5	39.0	23.5
3	76.5	7.62	39.0	23.5	39.0	23.5
3½	92.0	9.20	41.0	25.5	41.0	25.5
4	$1.09	10.89	41.0	25.5	41.0	25.5
5	1.48	14.81	41.0	25.5	41.0	25.5
6	1.92	19.18	41.0	25.5	41.0	25.5

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5; Lorain, O. N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Ga.	—Seamless— H.R.	C.D.	—Elec. Weld— H.R.	C.D.
1	13	12.36	14.39	13.96	13.96
1¼	13	14.63	17.05	14.19	16.54
1½	13	16.17	19.02	15.68	18.45
1¾	13	18.39	21.64	17.84	20.99
2	13	20.61	24.24	19.99	23.51
2¼	13	22.96	27.03	22.27	26.22
2¾	12	25.29	29.76	24.53	28.87
2½	12	27.71	32.58	26.88	31.60
2¾	12	29.36	34.53	28.48	33.49
3	12	30.82	36.27	29.90	35.18
3¼	11	35.87	42.22	34.79	40.95
3½	11	38.52	45.35	37.36	43.99
4	10	47.82	56.25	46.39	54.56
4½	9	63.37	74.59	61.47	72.35
5	9	73.37	86.32	71.17	83.73
6	7	112.62	132.51	....	....

Boiler tube producers include Babcock & Wilcox Tube Co., National Tube Co., Globe Steel Tubes Co., Pacific Tube Co., Pittsburgh Steel Co., Republic Steel Corp., Standard Tube Co.

CLAD STEELS

(Cents per pound)

Cladding	—Plates— Carbon Base		—Strip— Cold-Rolled Carbon Base		—Sheets— Carbon Base 10%	20%	Copper Base Both Sides
Stainless	10%	20%	10% Both Sides				
302	....	....	....	....	19.75	21.50–	75.00
304	22.50	26.50	....	....	20.75	22.50–	77.00
305	....	....	....	....	....	....	79.00
309	27.00	31.00	....	....	....	....	....
310	32.50	36.50	....	....	....	....	105.00
316	27.00	31.00	....	....	26.00	28.00–	....
317	30.50	34.50	....	....	....	....	....
318	29.50	33.50	....	....	....	....	....
321	23.50	27.50	....	....	23.00	25.00	90.00
347	25.00	29.00	....	....	24.00	26.00–	94.00
405	18.75	24.75	....	....	....	....	....
410	18.25	24.25	....	....	....	....	....
430	18.25	24.25	....	....	....	....	....
Nickel	27.50	34.50	31.50	41.00	....	....	88.00
Inconel	36.00	46.00	....	....	....	....	115.00
Monel	29.00	37.00	26.50	33.50	....	....	83.00
Copper*	....	....	19.75†	23.75†	....	....	....

* Deoxidized. † Deduct 4.25c for hot-rolled. Production for carbon base products are: Stainless plates and sheets, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16 and Coatesville, Pa. L7; nickel, inconel and monel-clad plates, Coatesville L7; nickel, monel and copper-clad strip, Carnegie, Pa. S18. Production point for copper-base sheets is Carnegie A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. plants; per cent off list for less than case lots)

½-in. and smaller; 6 in. and shorter 27
⅝ & ¾ x 6 in., shorter. 29
⅞-in. & larger x 6 in., shorter 26
All diameters longer than 6-in. 22
Tire bolts 20
Plow bolts 40
Lag bolts, 6 in., shorter. 30
Lag bolts, longer than 6 in. 28

SEMIFINISHED HEXAGON NUTS

(Per cent off list for less than case or keg quantities)

	Hvy.	Reg.	Lght.
½-in. and smaller	35	41	41
⅝-in. and ¾-in.	30	36	36
⅞-in.-1½ in.	27	31	33
1⅝-in. and larger	17	21	..

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:
¼-in. through ⅝-in... 50
⅞-in. through 1 in. diam. 43
Longer than 6 in.:
¼-in. through ⅝-in. diam. 33
⅞-in. through 1 in. diam. 13

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam x 6 in and smaller 46
1 in. and smaller diam. x over 6 in. 33

RIVETS

F.o.b. midwestern plants
Structural ½-in., larger 7.25c
⅜-in., under .....43 off

Washers, Wrought

F.o.b. shipping point, to jobbers .....Net to $1 off

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Inches Diam.	Length	Cents per lb.
17,18,20	60,72	16.00
8 to 16	48,60,72	16.50
7	48,60	17.75
6	48,60	19.00
4,5⅛	40	19.50
3	40	20.50
2½	24,30	21.00
2	24,30	23.00

CARBON

40	100,110	7.50
35	100,110	7.50
30	84,110	7.50
24	72 to 104	7.50
17 to 20	34,90	7.50
14	60,72	8.00
10,12	60	8.25

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $37; less than 60%, $34. Imported, net ton, duty paid, metallurgical grade, $39-$40.

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301...	37.50	30.50	28.50
302...	37.50	33.00	28.50
303...	39.50	36.50	31.00
304...	39.50	35.00	30.00
309...	52.00	52.00	41.50
316...	53.00	55.00	46.00
321...	45.50	44.50	34.00
347...	50.00	48.50	38.50
410...	33.00	27.00	23.00
416...	33.50	33.50	23.50
420...	40.50	43.50	28.50
430...	35.50	27.50	23.50
501...	24.00	22.50	11.50
502...	25.00	23.50	12.50

Baltimore, Types 301 through 347 sheets, except 309 E2.
Baltimore, bars, wire and structurals A10.
Brackenridge, Pa., sheets A4
Bridgeville, Pa., bars, wire, sheets & strip, except Type 309 strip quoted 51.00c U4.
Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502 A10.
Carnegie, Pa., strip except Type 416; Type 309 strip quoted 51.00c S18.
Cleveland, strip, except Type 309 quoted 51.00c, and except Type 416 A7.
Detroit, strip, except Type 309 M1.
Dunkirk, N. Y., bars, wire A4.
Duquesne, Pa., bars C3.
Gary, Ind., sheets except Type 416 C3.
Harrison, N. J., strip C18.
Massillon, all products, except Type 309 bars, wire & cept Type 300 bars, wire & structurals quoted 42.00c, Type 501, 10.50c, Type 502 11.50c R2.
McKeesport, Pa., bars; sheets except Type 416, C3.
McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.
Middletown, O., sheets and strip, except Types 303, 416, 420, 501 and 502 A10.
Midland, sheets & 3trip C18.
Munhall, Pa., bars C3.
Pittsburgh, sheets C18.
Reading, Pa., bars & strip except Type 309 bars quoted 42.00c C4.
So. Chicago, Ind., bars & structurals C3.
Syracuse, N. Y., bars, wire & structurals C18.
Titusville, Pa., bars U4.
Wallingford, Conn., strip, except 309, W2 quotes ¼-cent higher.
Washington, Pa., bars, sheets & strip except Type 309 strip quoted 51.00c J3.
Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 58.00c strip 60.00c W4.
Watervliet, N. Y., structurals & bars A4.
Waukegan, bars & wire A7.
West Leechburg, Pa., strip, except Type 309 quoted 51.00c A4.
Youngstown, strip C8.

COAL, CHEMICALS

Spot, cents per gallon, ovens
Pure benzol 22.00
Toluol, one deg..19.00-24.75
Industrial xylol ..20.50-26.50
Per ton bulk, ovens
Sulphate of ammonia..$45.00
Per pound, ovens
Phenol, 40 (carlots, returnable drums) 13.25
Do., less than carlots..14.00
Do., tank cars 12.50

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh)

	Cents
Sponge Iron: 98+% Fe, carlots...	15.00
Swedish, c.i.f. New York, in bags..	7.40-8.50
Electrolytic Iron: Annealed, 99.5% Fe.	39.50
Unannealed, 99+% Fe	33.50
Unannealed, 99+% Fe (minus 325 mesh)	48.50
Carbonyl Iron: 97.9-99.8%, size 5 to 10 microns..	65.00-130.00
Aluminum: Carlots, freight allowed	27.00
Atomized, 500-lb drums, freight allowed	30.00
Brass, 10-ton lots.	23.25-26.25
Copper: Electrolytic	27.75
Reduced	27.00
Lead	18.50
Manganese: Minus 100-mesh	52.00-55.00
Minus 35 mesh	48.00
Minus 200 mesh	56.00
Nickel, unannealed	61.00-66.00
Silicon	34.00-40.00
Solder (plus cost of metal)	8.50
Stainless Steel, 302...	75.00
Tin	90.00-90.75
Zinc, 10-ton lots..	15.50-18.25
	Dollars
Tungsten: 99%, minus 80 to 200 mesh, freight allowed, 1000 lb and over ..	2.90
500 to 1000 lb	2.95
less than 500 lb ..	3.05
98.8%, minus 65 - mesh, freight allowed, 1000 lb and over ..	2.90
less than 1000 lb ..	3.05
Molybdenum: 99%, minus 80 to 200 mesh, over 500 lb	2.25
200 to 500 lb	2.50
less than 200 lb ..	2.75
82-88%, freight allowed, 2000 lb and over ..	2.40
less than 2000 lb ..	2.45
Chromium, electrolytic, 99% Cr min.	3.50

METALLURGICAL COKE

Price per Net Ton

BEEHIVE OVENS

Connellsvil, fur. $13.00-13.50
Connellsvil, fdry..15.00-16.00
New River, foundry....18.00
Wise county, foundry..15.35
Wise county, furnace..14.60

OVEN FOUNDRY COKE

Kearny, N. J., ovens.$22.00
Everett, Mass., ovens . New England, del.‡..22.70
Chicago, ovens 20.00
Chicago, del. .....†21.45
Detroit, del. 23.91
Terre Haute, ovens....20.20
Milwaukee, ovens 20.75
Indianapolis, ovens 19.85
Chicago, del. 23.32
Cincinnati, del. 22.77
Detroit, del. 23.75
Ironton, O., ovens 19.40
Cincinnati, del. 21.63
Painesville, O., ovens..20.90
Buffalo, del. 23.02
Cleveland, del. 22.62
Erie, del. 21.04
Birmingham, ovens 17.70
Philadelphia, ovens 20.45
Swedeland, Pa., ovens.20.40
Portsmouth, O., ovens.19.50
Detroit, ovens 20.65
Detroit, del. *21.70
Buffalo, del. 22.95
Flint, del. 23.00
Pontiac, del. 21.98
Saginaw, del. 23.30

Includes representative switching charge of: *, $1.05; †, $1.45, one-track charge being $1.20, two tracks $1.40, and three or more tracks $1.50. ‡ Or within $4.03 freight zone from works.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		Bars			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R. 15 Ga.	Galv. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§		Carbon	Floor
New York (city)	5.75	6.84	7.20	6.04	...	5.85	6.64	8.60	5.65	5.90	7.34
New York(c'try)	5.55	6.54	6.90	5.84	...	5.65	6.44	8.40	5.45	5.70	7.14
Boston (city) ..	5.93	6.68	7.44	5.98	...	5.80	6.78	9.07	5.75	6.08	7.28
Boston (c'try) .	5.73	6.48	7.24	5.78	...	5.60	6.58	8.87	5.55	5.88	7.08
Phila. (city) ..	6.40	6.49	6.95	5.90	...	5.75	6.46	8.40	5.50	5.70	6.80
Phila. (c'try) .	6.15	6.24	6.70	5.65	...	5.50	6.21	8.15	5.25	5.45	6.55
Balt. (city) ...	5.25	6.69	6.66	5.79	...	5.69	6.39	...	5.69	5.40	7.04
Balt. (c'try) ..	5.05	6.49	6.46	5.59	...	5.49	6.19	...	5.49	5.20	6.84
Norfolk, Va. ..	5.80‡	...	...	...	...	6.05	7.05	...	6.05	6.05	7.55
Wash. (w'hse).	6.07‡	...	...	6.00	...	5.90	6.62	...	5.90	6.10	7.47
Buffalo (del.)..	5.20	5.95	6.94	5.56	...	5.20	5.85	10.43†† [5]	5.30	5.60	6.90
Buffalo (w'hse)	5.05	5.80	6.79	5.41	...	5.05	5.65	9.90†† [5]	5.15	5.45	6.75
Pitts. (w'hse)..	5.05	5.80*	6.45-6.70	5.20	6.15	5.00	5.75	9.55††	5.05	5.15	6.40
Detroit (w'hse)	5.33	6.08*	7.09	5.49	...	5.39	6.03	9.86†† [5]	5.44	5.59	6.68
Cleveland (del.)	5.25	6.00	7.15	5.44	6.20	5.32	5.95	8.31	5.37	5.52	6.87
Cleve. (w'hse).	5.05	5.80	6.95	5.24	6.00	5.12	5.75	8.16	5.17	5.32	6.67
Cincin. (w'hse).	5.32	5.84	6.29	5.49	...	5.39	6.10	9.90†† [5]	5.44	5.59	6.75
Chicago (city)..	5.25	6.00*	6.90	5.30	...	5.20	5.85	9.75†† [5]	5.25	5.40	6.60
Chicago (w'hse)	5.05	5.80*	6.70	5.10	...	5.00	5.65	9.55†† [5]	5.05	5.20	6.40
Milwaukee(city)	5.39	6.14*	7.04	5.44	...	5.34	6.09	9.89†† [5]	5.39	5.54	6.74
Milwau. (c'try).	5.19	5.94*	6.84	5.24	...	5.14	5.89	9.69†† [5]	5.19	5.34	6.54
St. Louis(del.).	5.53	6.28	7.18	5.58	...	5.48	6.23	10.03†† [5]	5.53	5.68	6.88
St. L. (w'hse).	5.38	6.13	7.03	5.43	...	5.33	6.08	9.88†† [5]	5.38	5.53	6.73
Birm'ham (del.)	5.20 [10]	5.95	6.30 [2]	5.25 [10]	...	5.15 [10]	6.88	...	5.20 [10]	5.35 [10]	7.63 [10]
Birm'hm(w'hse)	5.05 [10]	5.80	6.15 [2]	5.10 [10]	...	5.00 [10]	...	...	5.05 [10]	5.20 [10]	...
Omaha, Nebr...	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Los Ang. (city)	5.60	7.15	7.60	6.10	7.75	5.75	7.40	...	5.60	5.65	7.90
L. A. (w'hse)..	5.45	7.00	7.45	5.95	7.60	5.60	7.25	...	5.45	5.50	7.75
San Francisco..	6.25 [9]	8.60 [2]	7.50 [2]	6.75 [9]	8.25 [3]	6.15 [9]	7.80 [8]	...	6.00 [9]	6.15 [9]	8.10 [8]
Seattle-Tacoma.	6.70 [2]‡	8.15 [3]	...	7.35	...	6.35	8.50	10.10	6.20	6.35 [7]	8.40 [7]
Kans. (w'hse)..	5.65	6.40	7.30	5.70	...	5.60	6.35	10.10	5.65	5.80	7.00

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded); ‡ as rolled; †† as annealed. Base quantities: 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 1000 lb and over; [1]—1500 lb and over; [2]—500 to 1499 lb; [3]—450 to 1499 lb; [4]—400 to 1499 lb; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—300 to 999 lb; [8]—300 to 499 lb; [9]—400 to 3999 lb; [10]—500 to 9999 lb inc.

REFRACTORIES

(Prices per 1000 bricks, f.o.b. plant)

FIRE CLAY BRICK

Super Duty: **St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Ky., Clearfield, or Curwensville, Pa., $107; Ottawa, Ill., $100. Hard-fired, $141 and $135, respectively at various points.**

High-heat Duty: **Salina, Pa. $91; Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, or Curwensville, Pa., Olive Hill, Hitchins, Haldeman, or Ashland, Ky., Troup, or Athens, Tex., Stevens Pottery, Ga., Portsmouth, or Oak Hill, O., $86; Ottawa, Ill., $80.**

Intermediate-Heat Duty: **St. Louis, or Vandalia, Mo., West Decatur, Orviston, Beach Creek, or Clearfield, Pa., Olive Hill, Hitchins, or Haldeman, Ky., Athens, or Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., $80; Ottawa, Ill., $74.**

Low-Heat Duty: **Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., Bessemer, Ala., $72; Ottawa, Ill., $66.**

LADLE BRICK

Dry Press: **$55, Freeport, Merill Station, Clearfield, Pa., Chester, New Cumberland, W. Va., Irondale, Wellsville, O.**

Wire Cut: **$53, Chester, New Cumberland, W. Va.; Wellsville, O.**

MALLEABLE BUNG BRICK

St. Louis, Mo., Olive Hill, Ky., $96; Ottawa, Ill., $90; Beach Creek, Pa., $86.

SILICA BRICK

Mt. Union, Claysburg, or Sproul, Pa., Portsmouth, O., Ensley, Ala., $86; Hays, Pa., $91; Joliet or Rockdale, Ill., E. Chicago, Ind., $95; Lehi, Utah, Los Angeles, $101.

Eastern Silica Coke Oven Shapes **(net ton): Claysburg, Mt. Union, Sproul, Pa., Birmingham, $84.**

Illinois Silica Coke Oven Shapes **(net ton): Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $85.**

BASIC BRICK

(Base prices per net ton; f.o.b. works, Baltimore or Chester, Pa.)

Burned chrome brick, $66; Chemical-bonded chrome brick, $69; magnesite brick, $91; chemical-bonded magnesite, $80.

MAGNESITE

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

Domestic dead-burned, ⅜" grains; Bulk, $30.50-$31; single paper bags, $35-$35.50.

DOLOMITE

(Base prices per net ton)

Domestic, dead-burned bulk; Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Millville, W. Va., Nario, Millersville, Martin, Gibsonburg, Woodville, O., $12.25; Thornton, McCook, Ill., $12.35; Dolly Siding, Bonne Terre, Mo., $12.45.

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports. Any increase or decrease in R.R. freight rates, dock handling charges and taxes thereon are for buyer's account.

Old range bessemer	$7.60
Old range nonbessemer	7.45
Mesabi bessemer	7.35
Mesabi nonbessemer	7.20
High phosphorus	7.20

EASTERN LOCAL ORE

Cents per unit, del. E. Pa.

Foundry and basic 56.62% concentrates, contract	16.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hemitites	15.75
Brazil iron ore, 68-69%	18.00

TUNGSTEN ORE

Wolframite, scheelite, net ton unit, duty paid	$20-$22

MANGANESE ORE

Long term contracts, nominal; nearby, 48%, duty paid, 79.8c-81.8c per long ton unit, c.i.f. U. S. ports; prices on lower grades adjusted to manganese content and impurities.

CHROME ORE

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48%	2.8:1	$35.00
48%	3:1	37.50
48%	no ratio	28.50-29.00

South African Transvaal

44%	no ratio	$17.00-18.00
45%	no ratio	18.00-18.50
48%	no ratio	26.00-27.00
50%	no ratio	27.00-27.50

Brazilian

44%	2.5:1 lump	$32.00

Rhodesian

45%	no ratio	$20.00-21.00
48%	no ratio	28.00-29.00
48%	3:1 lump	37.50

Domestic—rail nearest seller

48%	3:1	$39.00

MOLYBDENUM

Sulphide concentrates per lb, molybdenum content, mines	$0.90

FERROALLOYS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $65, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $172 per gross ton of alloy, c.l., packed, $184; gross ton lots, packed, $199; less gross ton lots, packed, $216; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Welland, Ont. Base price: $174, f.o.b. Birmingham and Johnstown, Pa., furnaces; $172, Sheridan, Pa.; $175, Etna, Pa. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $214; less gross ton lots, $231 f.o.b. Chicago. Add or subtract $2.15 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c. Delivered. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Carload 2" x D, packed 35.5c per lb of metal, ton lot 37c, less ton 39c. Delivered. Spot, add 2c.

Manganese, Electrolitic: Less than 250 lb, 35c; 250 lb to 1999 lb, 32c; 2000 to 35,999 lb, 30c; 36,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn., Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 8.95c per lb of alloy, carload packed, 9.70c, ton lot 10.60c, less ton 11.60c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. Spot, add 0.25c.

Chromium Alloys

High-Carbon Ferrochrome: Contract, c.l., lump, bulk, 20.5c per lb of contained Cr, c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

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UNIVERSITY OF MICHIGAN LIBRARIES

Demand for Copper Remains Heavy

One producer will limit February sales to current refined output. Custom smelters raise bids for red metal scrap as intake falls below needs. Tin eases to 77.00c

New York—Evidence of a further strengthening in the copper market is noted. Custom smelters and brass ingot makers have advanced their buying prices for red metal scrap ¼-cent to the basis of 15.50c for No. 1 copper wire scrap, but they have been unsuccessful in their attempt to bring out larger tonnages.

Scrap at this price is equivalent to a refined copper price of about 18.50c a pound, the current open market level. Some scrap sellers are seeking an additional ¼-cent a pound for their holdings. Since custom smelters claim they can not pay any more for their scrap and still sell refined copper at the 18.50-cent level, an advance in that section of the market would not be surprising if scrap supplies continue below requirements.

Copper—Consumers of certain copper shapes are still having difficulty in obtaining desired tonnages. Another sharp drop in stocks of refined copper is indicated for January, which would be the fifth consecutive monthly decline since the uptrend which halted in September. Since the revived demand for copper got under way in mid-summer, producers' surplus supplies have dropped sharply. From the 1949 high of 217,167 tons at the end of August, stocks fell to 139,285 tons at the end of November.

Sales booked by producers for December delivery indicate shipments last month of around 113,413 tons, including an undelivered carryover of 6951 tons from November. Orders placed for shipment this month already exceed 90,000 tons. While three large domestic producers have opened their order books for February delivery contracts, one major producer will limit February sales to his current refined output. Mine production in this country now is generally established on a six-day basis.

In addition to the pressure from domestic producers, better demand from abroad for foreign-origin metal is noted. Italy, which has been seeking 5000 tons for some time, has finally placed this business at the prevailing price of 18.50c a pound, New York. Inquiries for smaller tonnages from Switzerland and India also are reported.

Imports of refined copper increased about 7800 tons in November to a total of 19,974 tons. It is pointed out in the trade that this volume of imports is wholly inadequate to meet the demands of consumers in this country.

Tin—Tin Sales Corp., selling agency for the Reconstruction Finance Corp., reduced its selling price for grade A tin ½-cent a pound, effective as of Jan. 9, to the basis of 77.00c, New York, for prompt delivery. The reduction was put into effect to meet the offering price on the open market which had eased to the 77-cent level on Jan. 6. Demand continues fair with most consumers preferring to cover their needs through private industry. Since available supplies are not adequate to meet all needs fully, some business is still going through RFC channels.

Undertone of the market remains soft with futures offered as low as 74.00c for April arrival. Other futures positions are quoted at 74.50c for March, 74.75c for February and 75.75c for January arrival. Chinese tin, 99 per cent grade, is offered at 72.00c for prompt delivery.

Shipments of Straits tin from Singapore and Penang in December totaled 8192 tons which set a new postwar high. They compare with only 2604 tons in November and 1753 tons in December, 1948. Shipments to the United States alone in December amounted to 7275 tons, reflecting the heavy purchases made by a large industrial interest in early December, mainly against offerings made on behalf of the British Ministry of Supply. Total shipments of Straits tin amounted to 54,751 tons in 1949, of which 43,990 tons, or 80 per cent, came to the United States. This represented an increase of 7557 tons over the 47,194 tons shipped in 1948 when the United States received only 29,497 tons or 62.5 per cent of the total.

Zinc — Statistical position of the zinc industry continues strong despite a disappointing showing for December. Trade authorities here point out that the report covering the final month of the year is misleading in that it fails to take into account a large tonnage of zinc on requisition for government account. This latter item is believed to exceed 5000 tons. If the metal for government account had been moved out of the yards of the producer by the yearend, stocks would have shown a moderate decrease.

Stocks of slab zinc at the end of December totaled 93,964 tons compared with 89,019 tons at the end of November and 97,666 tons at the end of October, the 1949 high. At the beginning of the year, stocks totaled only 20,848 tons.

Smelter output increased about 6000 tons last month to a total of 71,096 tons, of which 17,750 tons were special high grade, 12,006 tons of ordinary high grade, 1448 tons of intermediate grade, and 39,852 tons of prime western, select and brass special. The 6000-ton increase in output resulted from a rise of about 3100 tons in special high grade and an increase of about 4600 tons in prime western. Production of ordinary high grade declined about 1750 tons. Total smelter production of zinc during 1949 amounted to 869,882 tons compared with 850,105 tons in 1948.

Deliveries of zinc to domestic consumers in December declined about 6000 tons to a total of 57,877 tons. Shipments on export and drawback account amounted to only 451 tons, while deliveries to the government for stockpiling amounted to 7823 tons. Total shipments in December amounted to 66,151 tons compared with the revised total of 73,702 tons in November and 75,132 tons in December, 1948.

Unfilled orders on the books of producers at the end of December amounted to 42,625 tons, or an increase of about 13,500 tons over the Nov. 30 figure of 29,166 tons.

Trade authorities give these additional reasons for the relatively poor showing in December: Some galvanizers were slow in getting back to full operations following the end of the steel strike; steadily dwindling coal supplies are causing some consumers to curtail their purchases of zinc; the almost complete disappearance of business on export account.

Lead—Demand for lead maintains a steady pace with all classes of consumers participating, including cable makers. Custom smelters are easily balancing their daily intakes of ore and concentrates.

Receipts of lead in ore and scrap by smelters in November totaled 48,314 tons, an increase of almost 5000 tons from the preceding month and an increase of 7000 tons from the like 1948 month, reports the American Bureau of Metal Statistics.

The gain in November resulted from a sharp rise in receipts of domestic lead in ore which rose to 36,329 tons from 29,497 tons in October. Receipts of lead in scrap declined to 4762 tons in November from 5921 tons in October. Total receipts of lead in ore and scrap during the first 11 months of 1949 amounted to 528,008 tons, compared with 442,368 tons in the like 1948 period.

Imports of refined lead in November totaled 27,658 tons against 27,155 tons in October. Total imports in the first 11 months of 1949 totaled 252,083 tons compared with 211,788 tons in the like period a year ago.

Lead Consumption Declines

Washington — Domestic consumption of lead in October decreased 7 per cent from the quantity used in September, says the Bureau of Mines. Total consumption of 80,616 tons as compared with 86,859 tons in September reduced the daily average to 2601 tons from 2895 tons and was 20 per cent under the October peak consumption of 1948.

In October, about 77 per cent of the lead consumed in the manufacture of commercial products was used in metal products, 11 per cent in pigments, 10 per cent in chemicals including tetraethyl fluid, and 2 per cent in miscellaneous and unclassified uses. After excluding 1204 tons contained in leaded zinc oxide, approximately 61 per cent of the remaining 79,412 tons consumed was refined soft lead, 27 per cent antimonial lead and 12 per cent was lead in scrap and in alloys. Use of lead in the manufacture of batteries decreased 12 per cent compared with September, but in tetraethyl fluid consumption increased 31 per cent, rising to the normal level of production.

Consumers' total stocks of lead remained virtually unchanged.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 18.50c, Conn. Valley, Lake, 18.62½c, Conn. Valley.

Brass Ingot: 85-5-5-5 (No. 115) 16.75-18.25c; 88-10-2 (No. 215) 25.25c; 80-10-10 (No. 305) 21.75c; No. 1 yellow (No. 405) 14.25-16.00c.

Zinc: Prime western 9.75-10.00c, brass special 10.00-10.25c, intermediate 10.25-10.50c, East St. Louis; high grade 11.10c, delivered.

Lead: Common, 11.80c; chemical, 11.90c; corroding, 11.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, f.o.b. shipping point.

Secondary Aluminum: Piston alloys 16.50-17.00c; No. 12 foundry alloy (No. 2 grade) 16.25-16.75c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 18.00-18.25c; grade 2, 17.50-17.75c; grade 3, 16.00-16.25c; grade 4, 15.50-15.75c. Prices include freight at carload rate up to 75 cents per 100 lb.

5% titanium-aluminum alloy No. 1 (low Cu) 31.00c; No. 2 (2% Cu) 28.00c, f.o.b. Eddystone, Pa.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, f.o.b. Freeport, Tex.

Tin: Grade A, prompt delivery, 77.00c; January arrival, 75.75c; February arrival, 74.75c; March arrival, 74.50c; April arrival, 74.00c. Chinese, 99% tin, prompt del., 72.00c.

RFC selling prices for prompt delivery, ex-dock New York or f.o.b. Texas City, Tex.: Grade A, 99.8% or higher (including Straits) 77.00c.

Antimony: American 99-99.8% and over but not meeting specifications below, 32.00c; 99.8% and over (arsenic 0.05% max.; other impurities, 0.1% max.) 32.50c; f.o.b. Laredo, Tex., for bulk shipments. Foreign, 99% (Chinese, English, Belgium), prompt, 26.00c, New York.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 40.50c. Prices include import duty.

Mercury: Open market, spot, New York $71-$74 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $24.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, $2 del.; special or patented shapes, $2.15.

Cobalt: 97-98%, $1.80 per lb for 550 lb (keg); $1.82 per lb for 100 lb (case); $1.87 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York, 73.25c per oz.

Platinum: $69-$72 per ounce.

Palladium: $24 per troy ounce.

Iridium: $100-$110 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill; based on 18.50-cent copper.)

Sheet: Copper 32.18; yellow brass 28.69; commercial bronze, 95% 32.10; 90%, 31.61; red brass, 85%, 30.60; 80%, 30.12; best quality, 29.58; nickel silver, 18%, 42.27; phosphor-bronze, grade A, 5% 50.90.

Rods: Copper, hot-rolled 28.03; cold-drawn 29.28; yellow brass free cutting, 23.19; commercial bronze, 95% 31.79; 90% 31.30; red brass 85% 30.29; 80% 29.81.

Seamless Tubing: Copper 32.22; yellow brass 31.70; commercial bronze 90% 34.27; red brass 85% 33.51; 80% 33.03.

Wire: Yellow brass 28.98; commercial bronze, 95% 32.39; 90% 31.90; red brass, 85% 30.89; 80% 30.41; best quality brass 29.87.

Copper Wire: Bare soft, f.o.b., eastern mills, 100,000 lb lots 22.55, l.c.l. 23.17, c.l. 22.67; weatherproof, f.o.b. eastern mills, 100,000 lb lots 24.85, l.c.l. 25.60, c.l. 25.10; magnet, delivered, c.l. 28.50, 15,000 lb or more 28.75, l.c.l. 29.25

ALUMINUM

Sheets and Circles: 2s and 3s mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-24	36.8	33.4	39.5
0.008-0.0075	12-24	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	——Hexagonal—— R317-T4	17S-T4
0.125	48.0	...	...
0.156-0.203	41.0	...	...
0.219-0.313	38.0	...	...
0.344	37.0	...	47.0
0.375	36.5	45.5	44.0
0.406	36.5	...	...
0.438	36.5	45.5	44.0
0.469	36.5	...	...
0.500	36.5	45.5	44.0
0.531	36.5	...	...
0.563	36.5	...	41.5
0.594	36.5	...	...
0.625	36.5	43.0	41.5
0.656	36.5	...	...
0.688	36.5	...	41.5
0.750-1.000	35.5	40.5	39.0
1.063	35.5	...	37.5
1.125-1.500	34.5	39.0	37.5
1.563	34.5	...	36.5
1.625	33.5	...	36.5
1.688-2.000	33.5	...	...
2.125-2.500	32.5	...	...
2.625-3.375	31.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more, $17.00 per cwt; add 50c per cwt, 10 sq ft to 140 sq ft. Pipe: Full coils, $17.00 per cwt. Traps and bends: List price plus 45%.

ZINC

Sheets, 15.50c f.o.b. mill, 36,000 lb and over. Ribbon zinc in coils, 15.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 14.00c; over 12-in., 15.00c.

NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes, 45.00c. Plates, 46.00c. Seamless tubes, 80.00c. Shot and blocks, 40.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb, 35.00-36.00c.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 25.50c; 5 tons and over 26.00c; 1 to 5 tons, 26.50c; less than 1 ton, 27.00c.

Copper Anodes: Base, 2000 to 5000 lb; f.o.b. shipping point, freight allowed; Flat untrimmed 28.84c: oval 28.34c; cast 26.87c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 46.50c f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 18.00c; 1000 to 19,000 lb, 17.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 25.75c; over 250 lb, 24.75c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 100 lb, 64.00c; f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 26.50c; 400-lb bbls, 24.50c, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over, 94.00c, 500 to 999 lb, 94.50c; 200 to 499 lb, 95.00c; less than 200 lb, 96.50c; ball, 1000 lb and over, 96.25c; 500 to 999 lb, 96.75c; 200 to 499 lb 97.25c; less than 200 lb, 98.75c f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 59.7c; 100 or 300 lb drums only, 100 to 500 lb, 51.4c; 600 to 1900 lb, 49.0c; 2000 to 9900 lb, 47.3c, f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100-lb drums 38.00c, f.o.b. Niagara Falls, N. Y.; 40.50c, f.o.b. Cleveland; 39.25c, del., Detroit and Philadelphia.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb 86.20c; more than 2000 lb, 84.20c, f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, 72.59c; 100 lb kegs 73.59c, f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	15.50	15.50	14.75
Yellow brass	12.50	12.25	11.37½
Commercial Bronze			
95%	14.50	14.25	13.75
90%	14.25	14.00	13.50
Red brass			
85%	14.00	13.75	13.25
80%	13.62½	13.37½	12.87½
Best Quality (71-80%)	13.37½	13.12½	12.62½
Muntz Metal	11.50	11.25	10.75
Nickel, silver, 10%	14.50	14.25	7.25
Phos. bronze, A	16.75	16.50	15.50
Naval brass	12.00	11.75	11.25
Manganese bronze	12.00	11.75	11.12½

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 15.50; No. 2 copper 14.50; light copper 13.50; composition red brass 12.50-12.75; radiators 10.00; heavy yellow brass 9.75.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 15.50; No. 2 copper 14.50; light copper 13.50; refinery brass (60% copper) per dry copper content 13.75.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and Brass: Heavy copper and wire, No. 1 13.50-13.75, No. 2 12.50-12.75; light copper 11.50-11.75; No. 1 composition red brass 11.00-11.25; No. 1 composition turnings 10.25-10.50; mixed brass turnings 6.25-6.50; new brass clippings 10.50-11.00; No. 1 brass rod turnings 9.25-9.50; light brass 6.00-6.25; heavy yellow brass 7.25-7.50; new brass rod ends 9.75-10.00, auto radiators, unsweated 8.50-8.75; cocks and faucets, 8.50-8.75; brass pipe 9.00-9.25.

Lead: Heavy 9.25-9.50, battery plates 4.50; linotype and stereotype 10.00-10.25; electrotype 9.00-9.25; mixed babbitt 9.25-9.50.

Zinc: Old zinc 4.25-4.75; new die cast scrap 4.00-4.50; old die cast scrap 3.00-3.25.

Tin: No. 1 pewter 42.00-42.50; block tin pipe 63.00-63.50, No. 1 babbitt 30.00-30.50.

Aluminum: Clippings 2S 10.50-11.00; old sheets 7.50-8.00, crankcase 7.50-8.00, borings and turnings 3.00-3.50.

DAILY PRICE RECORD

1949	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Jan. 6-12	18.50	11.80	9.75–10.00	77.00	17.00	32.00	40.00	73.25
Jan. 3-5	18.50	11.80	9.75–10.00	77.50	17.00	32.00	40.00	73.25
Dec. Avg.	18.50	11.80	9.769	78.966	17.00	32.00	40.00	73.25
Nov. Avg.	18.427	12.348	9.760	89.823	17.00	32.00	40.00	73.25

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

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IRON AND STEEL SCRAP

Consumer prices, except as otherwise noted, including brokers' commissions, as reported to STEEL, Jan. 12, 1950; gross tons except as noted. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Jan. 12	$26.33
Jan. 5	26.83
Dec. 1949	28.03
Jan. 1949	41.54
Jan. 1945	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 Heavy Melt.	$30.00
No. 2 Heavy Melt.	27.00-28.00
No. 1 Busheling	30.00
No. 1 Bundles	30.00
No. 2 Bundles	*24.00-25.00*
No. 3 Bundles	23.00-24.00*
Heavy Turnings	*26.00-27.00*
Machine Shop Turnings	*20.50-21.50†*
Mixed Borings, Turnings	*20.50-21.50†*
Short Shovel Turnings	25.00-26.00
Cast Iron Borings	*24.00-25.00*
Low Phos. Steel	*32.00-33.00*

Cast Iron Grades*

No. 1 Cupola Cast	*33.50-34.00*
No. 1 Machinery Cast	*38.00-39.00*
Charging Box Cast	31.00-32.00
Heavy Breakable Cast	27.00-28.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	*31.50-32.00*
Axles	*34.50-35.50*
Rails, Random Length	*35.50-36.00*
Rails, 2 ft. and under	*39.00-40.00*
Rails, 18 in. and under	*40.00-41.00*
Railroad Specialties	*34.00-34.50*
Angles, Splice Bars	*32.00-33.50*

* Nominal.
† Crushers' buying prices.

CLEVELAND

No. 1 Heavy Melt. Steel	$27.00-27.50
No. 2 Heavy Melt. Steel	24.50-25.00
No. 1 Busheling	27.00-27.50
No. 1 Bundles	27.00-27.50
No. 2 Bundles	*21.00-21.50*
Machine Shop Turnings	*17.00-17.50*
Mixed Borings, Turnings	19.50-20.00
Short Shovel Turnings	19.50-20.00
Cast Iron Borings	19.50-20.00
Low Phos.	29.00-29.50
Cut Structurals	30.00-30.50

Cast Iron Grades

No. 1 Cupola	42.50-43.50
Charging Box Cast	36.50-37.50
Stove Plate	35.50-36.50
Heavy Breakable Cast	33.50-34.50
Unstripped Motor Blocks	31.00-32.00
Brake Shoes	28.50-29.50
Clean Auto Cast	43.50-44.50
No. 1 Wheels	*35.50-36.00*
Burnt Cast	31.50-32.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	*32.00-32.50*
R.R. Malleable	38.50-39.00
Rails, 3 ft and under	*42.00-43.00*
Rails, 18 in. and under	*43.00-44.00*
Rails, Random Lengths	38.00-39.00
Cast Steel	34.00-35.00
Railroad Specialties	35.00-35.50
Uncut Tires	36.00-37.00
Angles, Splice Bars	40.00-41.00

VALLEY

No. 1 Heavy Melt. Steel	$30.00-30.50
No. 2 Heavy Melt. Steel	28.00-29.00
No. 1 Bundles	30.00-30.50
No. 2 Bundles	23.50-24.50
Machine Shop Turnings	*20.50-21.50*
Short Shovel Turnings	22.50-23.00
Cast Iron Borings	21.50-22.00
Low Phos.	31.50-32.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	*32.50-33.00*

PHILADELPHIA

No. 1 Heavy Melt. Steel	$23.50
No. 2 Heavy Melt. Steel	21.50-22.00
No. 1 Busheling	21.50-22.00
No. 1 Bundles	23.50
No. 2 Bundles	18.00-19.00
Machine Shop Turnings	16.50
Short Shovel Turnings	18.50
Mixed Borings, Turnings	*16.00*
Bar Crop and Plate	25.50-26.50
Punchings & Plate Scrap	25.50-26.50
Cut Structurals	25.00-26.00
Elec. Furnace Bundles	25.00-25.50
Heavy Turnings	24.00
No. 1 Chemical Borings	29.00

Cast Iron Grades

No. 1 Cupola Cast	32.00
No. 1 Machinery Cast	36.00-37.00
Charging Box Cast	34.00
Heavy Breakable Cast	34.00
Unstripped Motor Blocks	27.00
Clean Auto Cast	*36.00-37.00*
No. 1 Wheels	*37.00*
Malleable	39.00

CINCINNATI

No. 1 Heavy Melt. Steel	$27.00
No. 2 Heavy Melt. Steel	25.00
No. 1 Busheling	26.00
No. 1 Bundles	27.00
No. 2 Bundles	20.00
Machine Shop Turnings	14.00
Short Shovel Turnings	17.00
Mixed Borings, Turnings	17.00
Cast Iron Boring	17.00

Cast Iron Grades

No. 1 Cupola Cast	*39.00*
Charging Box Cast	32.00
Heavy Breakable Cast	*32.00*
Stove Plate	30.00
Unstripped Motor Blocks	22.00
Brake Shoes	22.00
Clean Auto Cast	40.00
Drop Broken Cast	*42.00*

Railroad Scrap

No. 1 R.R. Heavy Melt.	30.00
R.R. Malleable	32.00
Rails, Rerolling	36.00
Rails, Random Length	*33.00*
Rails, 18 in. and under	*42.00*

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 2 Heavy Melt. Steel	*$21.00-22.00*
No. 1 Bundles	*23.00-24.00*
No. 2 Bundles	*20.00-21.00*
No. 1 Busheling	*23.00-24.00*
Machine Shop Turnings	*12.00-13.00*
Mixed Borings, Turnings	*12.00-13.00*
Short Shovel Turnings	*14.00-15.00*
Cast Iron Borings	*16.00-17.00*
Punchings & Plate Scrap	*23.00-24.00*

Cast Iron Grades

No. 1 Cupola Cast	33.00-34.00
Heavy Breakable Cast	29.00-30.00
Clean Auto Cast	35.00-36.00

BUFFALO

No. 1 Heavy Melt. Steel	$27.50-28.00
No. 2 Heavy Melt. Steel	25.50-26.00
No. 1 Bushelings	25.50-26.00
No. 1 Bundles	26.50-27.00
No. 2 Bundles	24.00-24.50
Machine Shop Turnings	18.00-18.50
Mixed Borings, Turnings	19.00-19.50
Cast Iron Borings	19.00-19.50
Short Shovelings	19.50-20.00
Low Phos.	29.00-29.50

Cast Iron Grades

No. 1 Machinery	*36.00-36.50*
No. 1 Cupola	*34.50-35.00*
Malleable	32.00-33.00

Railroad Scrap

Rails, 2 ft. and under	38.00-39.00
Scrap rails	35.00-35.50
Specialties	33.00-34.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point

No. 1 Heavy Melt. Steel	*$20.00*
No. 2 Heavy Melt. Steel	*17.50-18.00*
No. 1 Busheling	*17.50-18.00*
No. 1 Bundles	*20.00*
No. 2 Bundles	*15.00-16.00*
Machine Shop Turnings	*10.50-11.00*
Mixed Borings, Turnings	*10.50-11.00*
Short Shovel Turnings	*10.50-11.00*
Punchings & Plate Scrap	*19.50-20.00*
Cut Structurals	*19.50-20.00*
Elec. Furnace Bundles	*19.50-20.00*

Cast Iron Grades

No. 1 Cupola Cast	26.00-27.00
No. 1 Machinery	29.00-30.00
Charging Box Cast	26.00-27.00
Heavy Breakable	26.00-27.00
Unstripped Motor Blocks	20.00-21.00
Malleable	*34.00*

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	$18.00-19.00
No. 2 Heavy Melt. Steel	17.00-17.50
No. 1 Bundles	18.00-19.00
No. 1 Busheling	17.00-17.50
Machine Shop Turnings	10.50-11.50
Mixed Borings, Turnings	11.00-11.50
Short Shovel Turnings	13.00-14.00
Bar Crops and Plate	20.00-21.00
Punchings & Plate Scrap	20.00-21.00
Chemical Borings	19.00-19.50

Cast Iron Grades

No. 1 Cupola Cast	29.50-32.50
Mixed Cast	25.50-26.50
Heavy Breakable Cast	26.50-27.50
Stove Plate	23.50-24.50
Unstripped Motor Blocks	19.50-20.50

CHICAGO

No. 1 Heavy Melt. Steel	$26.00-28.00
No. 2 Heavy Melt. Steel	24.00-25.00
No. 1 Bundles	25.00-26.00
No. 2 Bundles	22.00-23.00
Machine Shop Turnings	17.00-18.00
Mixed Borings, Turnings	17.00-18.00
Short Shovel Turnings	19.50-20.50
Cast Iron Borings	17.00-18.00
Low Phos.	29.50-30.50
Elec. Furnace Bundles	28.00-29.00
Heavy Turnings	23.00-24.00
Cut Structurals	29.00-30.00

Cast Iron Grades

No. 1 Cupola Cast	38.00-39.00
Clean Auto Cast	39.00-40.00
No. 1 Wheels	32.00-33.00
Stove Plate	32.00-33.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	28.50-29.50
Malleable	37.00-38.00
Rails, Rerolling	39.00-40.00
Rails, Random Lengths	32.00-33.00
Rails, 2 ft. and under	39.00-40.00
Rails, 18 in. and under	40.00-41.00
Railroad Specialties	30.00-31.00
Angles, Splice Bars	34.00-35.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$25.00
No. 2 Heavy Melt. Steel	24.50
No. 1 Busheling	24.00
No. 2 Bundles	22.00
Machine Shop Turnings	15.00
Mixed Borings, Turnings	15.00
Short Shovel Turnings	19.00
Cast Iron Borings	18.00
Bar Crops and Plate	30.00
Cut Structurals	23.00

Cast Iron Grades

No. 1 Cupola Cast	34.00-35.00
Stove Plate	28.00-30.00
No. 1 Wheels	23.00-24.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	28.00
R. R. Malleable	nominal
Rails, Rerolling	37.00
Rails, 3 ft. and under	25.00-26.00
Angles and Splice Bars	31.00-33.00

ST. LOUIS

No. 1 Heavy Melt. Steel	$29.00-30.00
No. 2 Heavy Melt. Steel	25.00-26.00
Machine Shop Turnings	14.00-15.00
Short Shovel Turnings	*18.00-19.00*

Cast Iron Grades

No. 1 Cupola Cast	35.00-36.00
Charging Box Cast	29.00-30.00
Heavy Breakable Cast	28.00-29.00
Brake Shoes	*28.00-29.00*
Clean Auto Cast	36.00-38.00
Burnt Cast	28.00-29.00

Railroad Scrap

R.R. Malleable	27.00-28.00
Rails, Rerolling	36.00-37.00
Rails, Random Lengths	32.00-33.00
Rails, 3 ft. and under	37.00-38.00
Uncut Tires	27.00-28.00
Angles, Splice Bars	32.00-33.00
Railroad Specialties	29.00-30.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos. 1 & 2 Bundles	16.00

Cast Iron Grades

No. 1 Cupola Cast	30.00-35.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Wheels	20.00
Rails, Random Lengths	20.00

SEATTLE

No. 1 Heavy Melt. Steel	$18.00
No. 2 Heavy Melt. Steel	18.00
No. 1 Busheling	15.50
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	13.00
Mixed Borings, Turnings	13.00
Punchings & Plate Scrap	22.00
Cut Structurals	22.00
Elec. Furnace Bundles	23.00

Cast Iron Grades

No. 1 Cupola Cast	25.00
Heavy Breakable Cast	20.00
Stove Plate	20.00
Unstripped Motor Blocks	18.00
Malleable	20.00
Brake Shoes	18.00
Clean Auto Cast	25.00
No. 1 Wheels	25.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	19.00
Railroad Malleable	25.00
Rails, Random Lengths	19.00
Angles and Splice Bars	19.00

LOS ANGELES

(F.o.b. car, Los Angeles)

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	12.00
Mixed Borings, Turnings	12.00
Punchings & Plate Scrap	24.00
Elec. Furnace Bundles	25.00

Cast Iron Grades

No. 1 Cupola Cast	*27.00-29.00*

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Rails, Rerolling	32.00

HAMILTON, ONT.

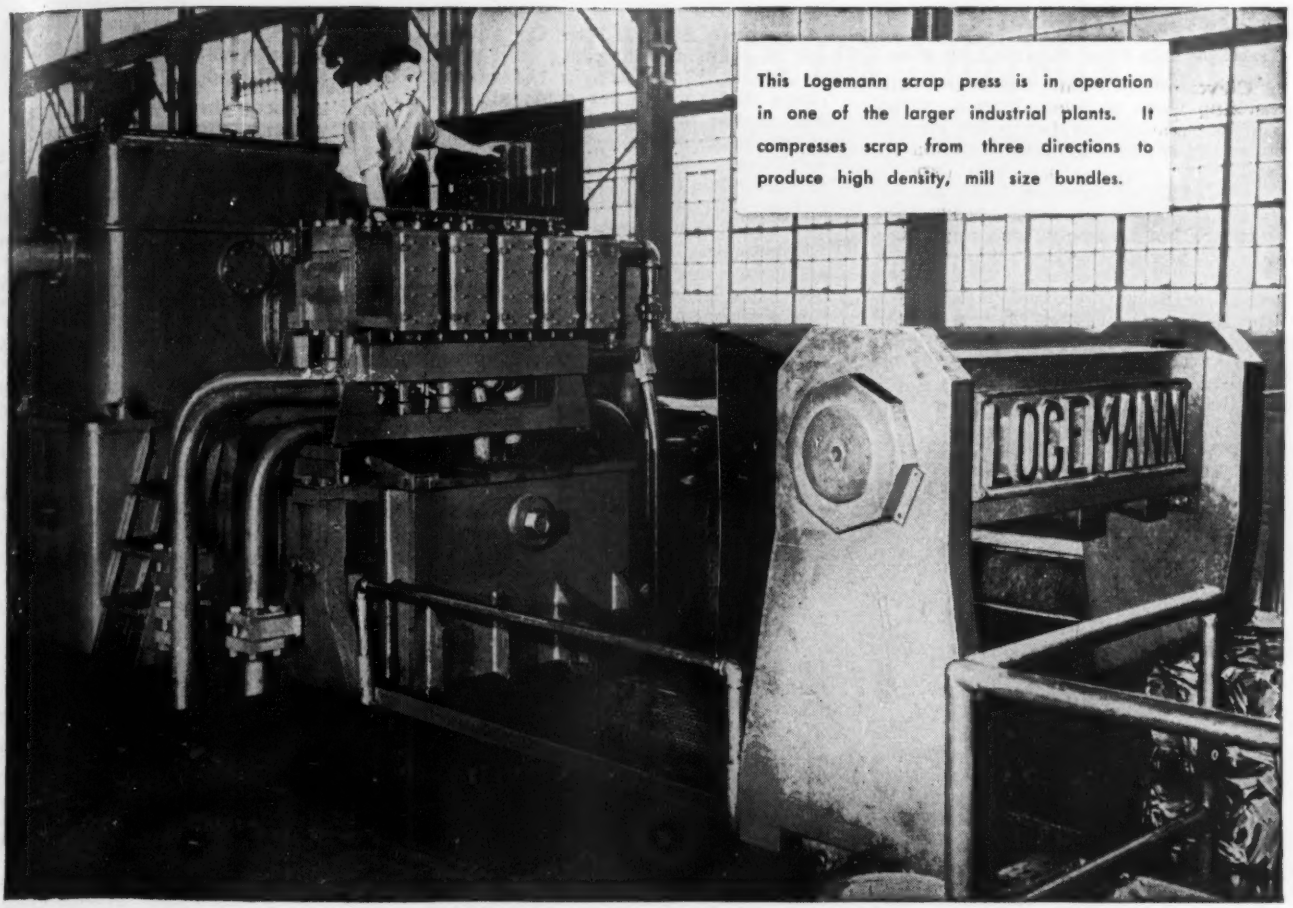
(Delivered prices)

Heavy Melt.	$24.00
No. 1 Bundles	24.00
Mechanical Bundles	22.00
Mixed Steel Scrap	20.00
Mixed Borings, Turnings	18.00
Rails, Remelting	24.00
Rails, Rerolling	27.00
Busheling	18.00
Bushelings new factory, prep'd	22.00
Bushelings new factory, unprep'd	17.00
Short Steel Turnings	18.00

Cast Iron Grades*

Cast	40.00-43.00

* Removed from price control Aug. 9, 1947; quoted on basis of f.o.b. shipping point.



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Triple Compression..
Automatically Controlled

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Both two-ram and three-ram models are available with automatic controls or for manual manipulation.

Logemann Bros. Co. have specialized in the production of scrap metal presses for sheet mills, stamping plants, scrap yards, and metal manufacturing plants of all types for nearly 75 years. Write for full information—please state the nature of your scrap and tonnage.

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Sheets, Strip . . .

Sheet and Strip Prices, Page 103 & 104 & 105

Cleveland — While consumers are seeking ways to avoid higher extras on flat-rolled products, so far no noticeable change in specifications is reported. Manufacturers are expected to absorb increased costs as far as possible, revamping production practice, design and purchasing methods to permit most economical operations. But economies will not be easily achieved. The mills point out the difference in extra charges is not sufficiently large to warrant widespread change by manufacturers in gage and width specifications. Republic Steel Corp.'s increase on flat-rolled, including both base price and extras, amounted to 4.7 per cent for instance. Changes in manufacturing practice to avoid this increase might entail still sharper hike in labor and equipment costs.

Currently, demand for sheets and strip is as pressing as ever. The mills are at least two months behind on shipments.

Philadelphia—Sheet mills are making little progress on arrearages. Demand is still heavy and most producers, despite efforts to keep commitments under control, still have more tonnage on books than they can deliver on scheduled time. At least two have not officially opened books for second quarter. Nevertheless, they have substantially more business than they can get out in the current 3-month period. Certain others have more tonnage on order than they can get out in the first half and they are still booking business, which to all practical intents and purposes means they are booking third quarter business.

Boston—Reluctant to pass on higher steel costs to finished products, although in some cases this may be inevitable, consumers are studying extras, base prices and freight charges to avoid peak increases. Specifications are being revised on both new and old orders. Advances in steel costs vary widely, users of silicon flat-rolled being hard hit. Some electrical grades are up over $40 per ton. Absorption of such an increase is doubtful. Danger attends further retail increase in some consumer goods; shoes, for instance, on which pressure for lower prices is strong. Yet tack plate averages $14 ton higher and shank steel $9. Stampers, paying $13 to $15 ton more unless operating with escalator clauses, experience trouble in getting more for parts from automobile industry.

New York—The household appliance industry generally is pressing actively for steel. Manufacturers of refrigerators, washing machines and stoves are specifying particularly freely and some producers are beginning to enter orders for third quarter on hot and cold sheets. Despite present briskness, there may be an easing fairly soon in the more expensive types of stoves.

Pittsburgh—Follansbee Steel Corp. has reduced its silicon sheet prices to competitive levels, resulting in reductions ranging from $2 to $12 per ton, the largest amount on electrical grade. Follansbee initiated price action on silicon raising quotations $35 per ton.

American Steel & Wire Co. advanced its cold-finished spring steel price on Jan. 6, $3 per ton in the carbon range 0.25 to 0.40 per cent; all carbon ranges over 0.45 in hard-rolled, untempered, soft annealed and tempered were increased $9 per ton. A new schedule of extras covering cold-rolled strip and cold-finished spring steels was announced.

Cincinnati—Sheet mills are booked solidly for first quarter. Pressure for deliveries may presage a similar demand for second quarter. Consumers who are hit hardest in the revisions of extras are studying the schedules for ways of reducing those applicable to their orders Ordering of stainless steel sheets, up abruptly during the strikes last fall, has leveled off.

Birmingham — Considerable pressure for sheets is evident here, even in the face of latest price revisions. Sheets, moving under mill-imposed allocations for some time, likely will continue in that position for some months, probably through the second quarter.

St. Louis—Sheet demand is holding firm. Although this district's shipments in December were probably the highest in peacetime history, pressure shows no signs of abating. Granite City Steel Co., for example, will open its second quarter books in about two weeks with allocations still in force on every product.

Los Angeles—Strong pressure for deliveries continues to mark sheet and strip demand. An important factor is the uptrend in requirements of gas appliance manufacturers in this district, whose sales are running 20 per cent ahead of 1949.

San Francisco—Consumers are still pressing heavily for flat-rolled products, and higher prices have had little dampening effect on demand. Reaction of fabricators to the upward revision in steel costs is still not apparent in the market for finished goods. Keener competition makes many producers reluctant to raise their selling prices.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 106

Cleveland—Other producers are putting new discount schedules on bolts and nuts into effect following action Jan. 3 by the Lamson & Sessions Co. In the main, sellers' new discount lists are competitive. However, all producers are not allowing freight on shipments of semi-finished nuts.

Pittsburgh—Slight improvement in demand for fasteners is under way. Some producers are operating 5 days per week, although this is not yet general within the industry at least so far as having all production facilities operating full time. Steel supply is adequate to sustain current production schedules but occasionally an unbalanced stock position develops in some sizes. All sellers here have announced revised discount price schedules in line with action initiated by producers outside this district Jan. 3. Oliver Iron & Steel Corp's new discount schedule was made effective Jan. 9; Russell Burdsall & Ward's on Jan. 10.

Steel Bars . . .

Bar Prices, Page 103

Boston—Best delivery on carbon bars is about three weeks on larger sizes and extending to April on smaller sizes. New buying is off in this area, except for forge shops with armament contracts. Most bar users are covered through this quarter and are not showing too much interest in second quarter. Alloy and cold-finished stock demand is spotty with deliveries around four weeks unless additional processing is required.

Buying by Springfield Armory and heavier inquiry from Watertown Arsenal feature bar activity. Close to 1000 tons are involved. Springfield placed contract for chrome-molybdenum rifle barrel blanks with Moore Drop Forging Co. at 69.80c each, delivered, inquiry calling for 245,300 units. Midwest Forge Co., Cleveland, took contract for 30,405 chromium-molybdenum - vanadium blanks at $2.85 each.

New York—Supply and demand is in good balance, according to sellers of hot carbon bars. Most are in position to make delivery within four to six weeks. On small sizes, however, certain sellers claim they are virtually booked up through March.

With the higher domestic market, importers of bars from Belgium and Luxembourg report a livelier interest. This foreign material is largely bessemer and in the smaller sizes.

Philadelphia—While some producers are sold into March on hot carbon bars, the majority can still promise delivery within four to five weeks. This is especially true with regard to the larger sizes.

Cleveland—Bars are moving actively into consumption, but pressure for tonnage is not comparable with that in the flat-rolled market. Buyers are ordering cautiously and tonnage is available for shipment before end of first quarter. Alloy bars are noticeably less active than carbon grade. Cold-finished bar sellers are booking tonnage for first quarter. The market is firmly established on the higher price level to which virtually all producers have advanced.

Chicago—All producers here have oriented their price schedules to the higher level, the last being LaSalle Steel Co. which upped its alloy bar prices on Jan. 10.

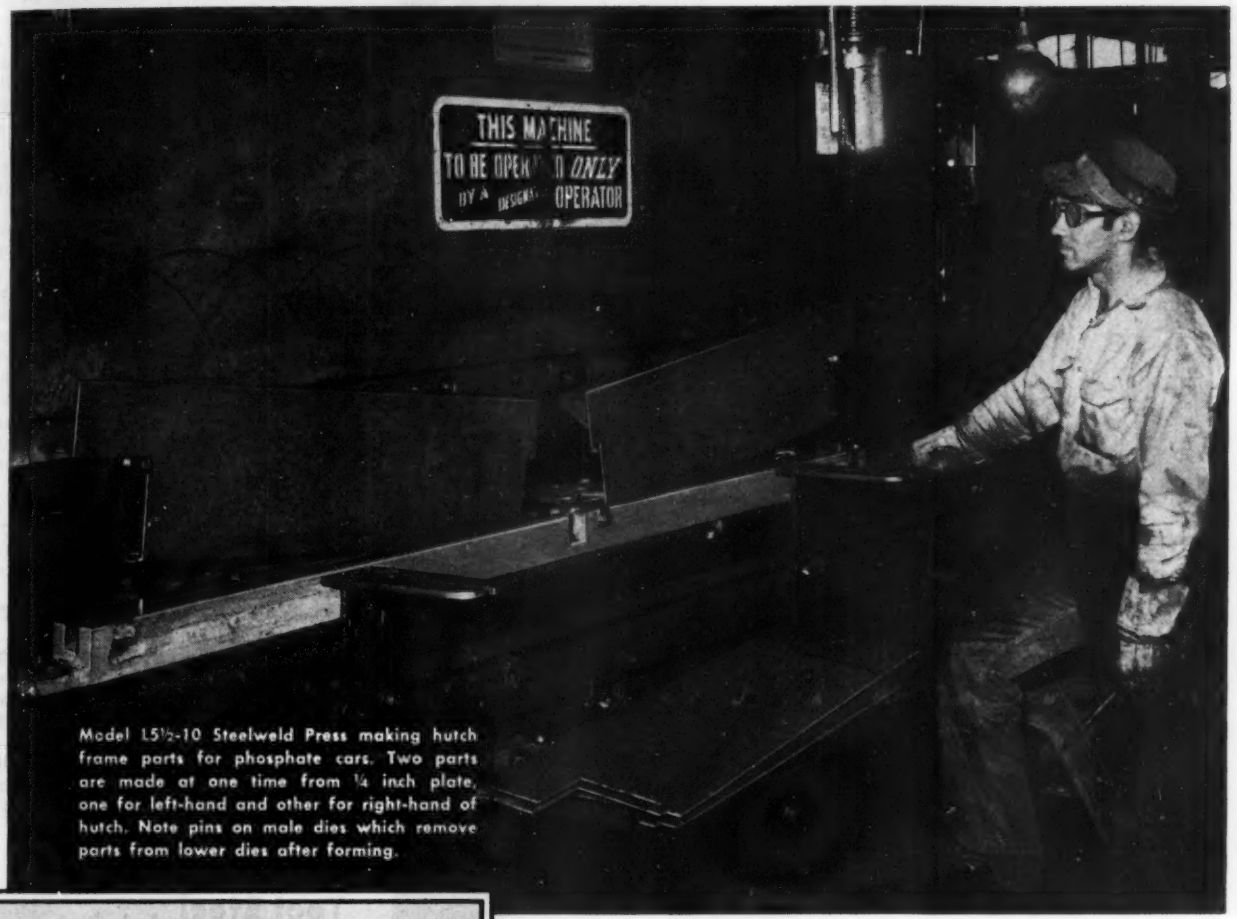
Los Angeles—Bar producers note a slightly stronger tone in demand, and several mills are stepping up schedules. Although automotive requirements are off temporarily, buying by miscellaneous fabricators and distributors has improved.

Reinforcing Bars . . .

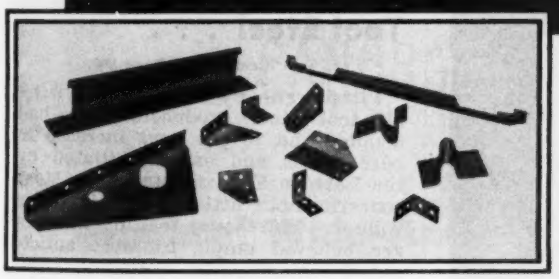
Reinforcing Bar Prices, Page 103

Seattle—Plant operations are still below normal, Bethlehem Pacific's local furnaces being down until Jan. 16. Northwest Steel has resumed rolling on a reduced scale. Backlogs are low and little new business is offering except in small tonnages. No important awards are pending. Mills have raised prices for reinforcing bars, fabricated to consumer, from 5.00c to 5.10c. Nut and bolt prices are unchanged.

PULLMAN-STANDARD FINDS MANY USES FOR STEELWELD PRESS



Model L5½-10 Steelweld Press making hutch frame parts for phosphate cars. Two parts are made at one time from ¼ inch plate, one for left-hand and other for right-hand of hutch. Note pins on male dies which remove parts from lower dies after forming.



A few of the many parts produced within a short period on the Steelweld Press. Curves and bends of every shape and degree are formed quickly and accurately.

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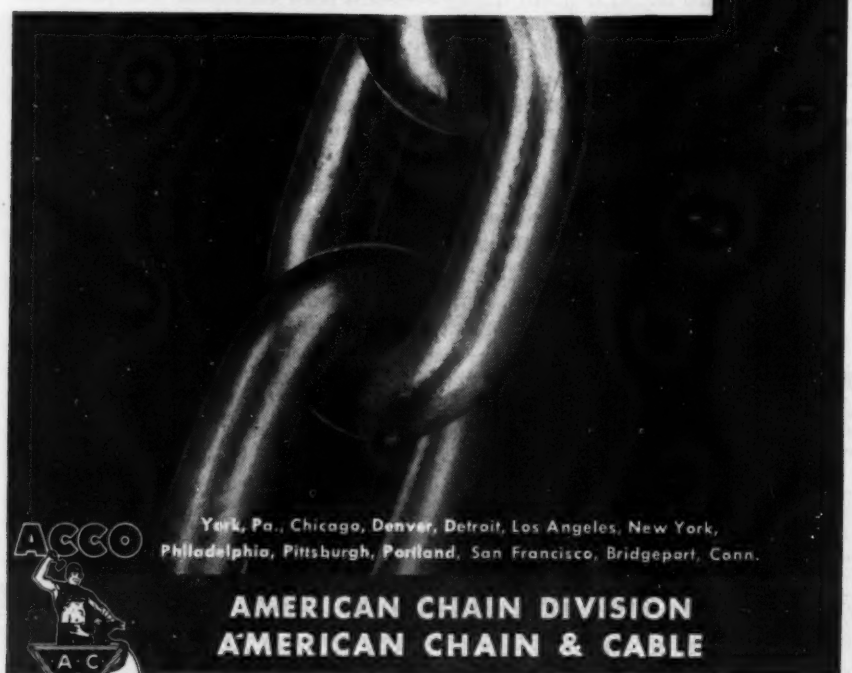

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Plates . . .

Plate Prices, Page 103

Philadelphia—Eastern plate mills are barely holding their own in point of new tonnage. Most producers can still make deliveries within three weeks and upon occasion can do even better. On the other hand, one large producer, which consumes a portion of its own tonnage, is fairly well scheduled through February on sheared plate. Meanwhile, one eastern Pennsylvania mill is resuming ingot production.

Boston—Lack of backlogs coupled with return of competition for what tonnage is going has erased wide spreads via premiums in carbon plate prices, but $2 a ton separates various eastern Pennsylvania producers on an f.o.b. mill basis. This puts Pittsburgh 3.50c f.o.b. at further disadvantage in this area with a 76-cent freight per 100 pounds to Boston, not including the 3 per cent federal tax. Fair part of plate shipments is by truck.

Demand for floor plates is relatively better than that for carbon. Outlook is enhanced by requirements for a $5 million oil storage plant, Saugus, Mass.

New York—Plate demand reflects sluggishness in a number of the heavier lines, notably railroad equipment and oil and gas requirements. Demand for light fuel oil tanks is fairly brisk, but is beginning to taper. The surprising thing is that it has held up as actively in view of the advancing season. Most mills can make deliveries in three to five weeks and on some specifications can do two weeks.

Tool Steel . . .

Tool Steel Prices, Page 105

Pittsburgh—By close of last week all tool steel producers here had adopted the 10 per cent increase in base prices and extras initiated by the Latrobe Electric Steel Co. Most concerns note little change in order volume. Warehouse tool steel stocks are believed ample to meet anticipated requirements, excluding some specialty items.

Wire . . .

Wire Prices, Page 105

Cleveland—Wire mills are holding substantial order backlogs but on some products the pressure is not too great and tonnage is available for shipment before end of first quarter. On certain specialties, bookings carry into second quarter. Nails are tight and the promising building outlook indicates a strong market in this product will prevail for months. Some talk is heard of a contemplated change in extras but this is not confirmed by leading sellers.

Birmingham—Most wire products are in reasonably good supply although demand is greater than had been anticipated for this season. Wire fencing demand has tapered off seasonally, but no great overage is evident. Nails, for the most part, are in much better supply, but many would-be carlot buyers are not being supplied.

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Tubular Goods . . .

Tubular Goods Prices, Page 106

Los Angeles—Firmness of pipe demand is undiminished, with particular emphasis on small diameters in the ½ to 1½ inch range. Residential construction is the major sustaining factor, and this activity continues at a high level. Pipe producers are booked through the first quarter.

San Francisco — Although large natural gas pipeline projects now underway or planned for 1950 will keep demand high for big diameter pipe, indications are that oil drilling activity in California will slump further this year. A large surplus of heavy oil has been a major factor in curtailing oil exploration.

Structural Shapes . . .

Structural Shape Prices, Page 103

New York—A fair amount of small work is being figured, although fabricators do not anticipate any great activity before March. By that time, a number of large jobs now in the pending stage are expected to be ready to go ahead—most of them public jobs.

Philadelphia — Most fabricators think it will be another several weeks before backlogs will reach a low point and start expanding. The larger shops have about three months work on hand, while the smaller have an average of around two and a half months business. Actually some interests look for the turn to come in March and point to an accumulating number of projects scheduled for figuring by that time.

Boston—Fabricated structural steel prices are not reflecting advances in plain material and competition for tonnage is paramount factor. Several district shops are active in bridge bidding for the first time and are crowding larger shops pricewise on small and medium size volume.

Cleveland — Weather conditions around this part of the country are relatively mild but normal seasonal influences serve to restrict construction activities. As a result structural steel demand is limited. Small tonnages are moving currently and no particular pickup is expected before March. Some price shading on fabricated work is reported. Substantial tonnage is being figured and an active building year is anticipated.

Milwaukee — Fabricators report wide variance in conditions. A few are working 60 hours a week. Many are down to less than half that. Bidding on new work is competitive and several companies which have entered bids which allow for no profit have been undercut by substantial margins. Supply of plain shapes poses almost no problem although delivery of wide flange beams, now widely specified, is far extended.

Birmingham — Structural shapes are not especially active and there is not much prospect of great improvement before the advent of spring.

San Francisco—No immediate pickup is expected during the next few weeks in private heavy construction because of seasonal factors. However, contractors are still hopeful of a better trend in the spring.

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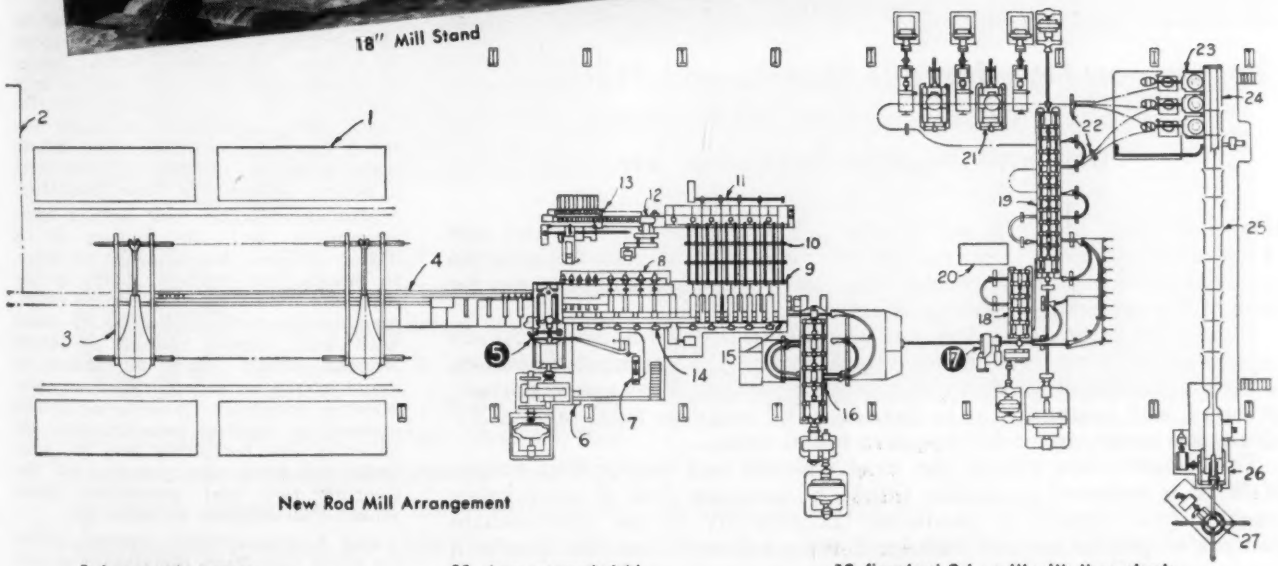

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12 shear
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15 oval turning device
16 3-stand 12 in. mill with repeaters on both sides
17 flying shear
18 two-stand 9 in. mill and repeaters on both sides
19 five-stand 9 in. mill with three stands on one drive, and two stands on another, and repeaters
20 mill control pulpit
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Ferroalloys . . .

Ferroalloy Prices, Page 107

Cleveland—Sellers of ferroalloys report business is coming in steadily with steel mill operations close to capacity and foundry operations showing signs of picking up. Buyers ordered heavily in the last quarter of 1949, no letup in volume accompanying the steel strike.

Warehouse . . .

Warehouse Prices, Page 107

Pittsburgh—Excluding galvanized sheets, warehouse steel product prices are uniformly at higher levels among distributors here. The original price announcement on galvanized sheets was $6.70 per 100 pounds, but some interests have adjusted their quotation to only $6.45. One of those interests at $6.70 has since reduced its price to $6.45. In addition to base prices established early in January, a new schedule on cold-rolled strip of $6.15 per 100 pounds was announced, accompanied with revised extras.

Cincinnati—Warehouses throughout the district have revised prices, and contend they are on a competitive basis. Buying is rather slow, without the quick upturn as expected after the holidays. An exception is in sheets for which tonnage inquiries are being made by some fabricators seeking to augment direct mill shipments.

Chicago—The new quantity extras are forcing users to buy more stock at a time, some users telling warehousemen they won't buy unless they can have the base quantity. Distributors fear a penalty is being exacted against the small shop whose plant would be choked up with steel if orders are only in base quantities.

Milwaukee—The new extras have consumers and distributors in a dither. Neither knows what to order. In sheets, for example, there is uncertainty over the sheared edge extra, many users now saying let it come with mill edge. Amount of short lengths which must be taken to avoid extras on structurals also complicates ordering. Warehouse stocks instead of moving into balance apparently are becoming less so, with mills following the practice of delivering two and sometimes three months allocations at once.

Los Angeles—With demand active for sheet and strip, distributor stocks are low in some flat-rolled categories. Plate requirements have eased. Warehouses are repricing their inventories in line with mill increases.

San Francisco—Demand for warehouse steel is still lagging. December volume slumped sharply, and virtually the only pressure is coming from would-be buyers of flat-rolled products.

Seattle—Effective Jan. 9, new warehouse prices were announced. Portland, Oreg., houses have not yet completed their analyses of new mill price schedules, but they are expected to revise their prices shortly. In Seattle, strip was raised from 6.70c to 7.35c; hot rolled rods, from 6.20c to 6.35c; cold-finished rods from 8.15c to 8.50c; structurals, from 6.00c to 6.20c.

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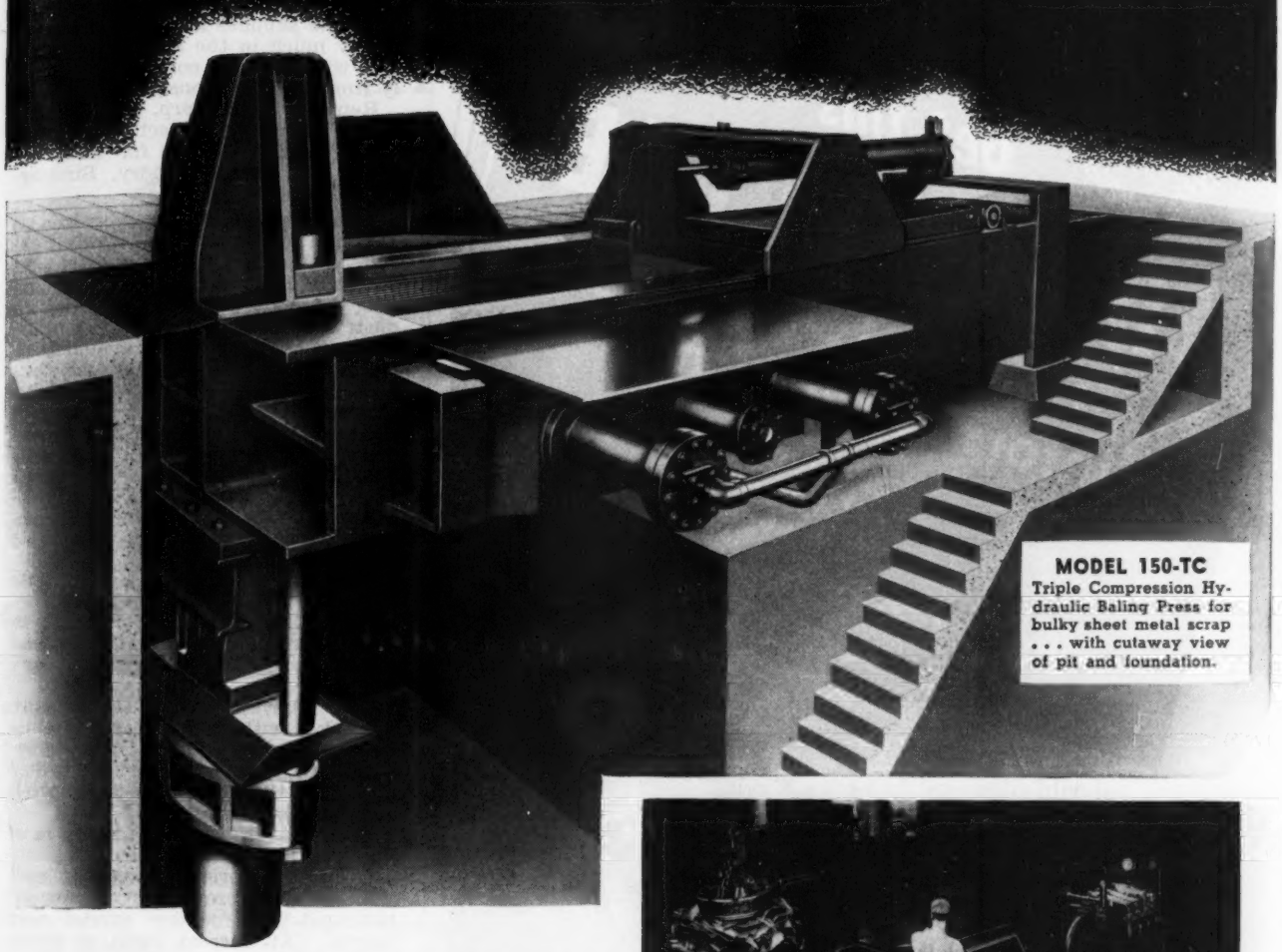

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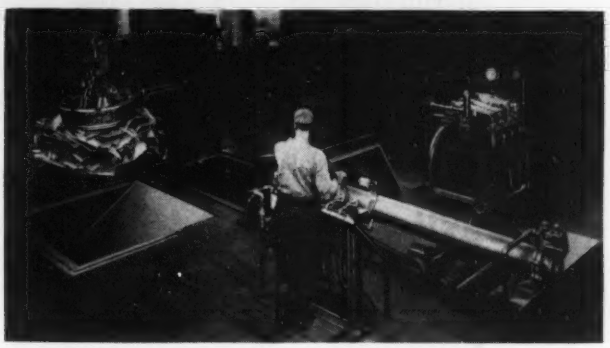

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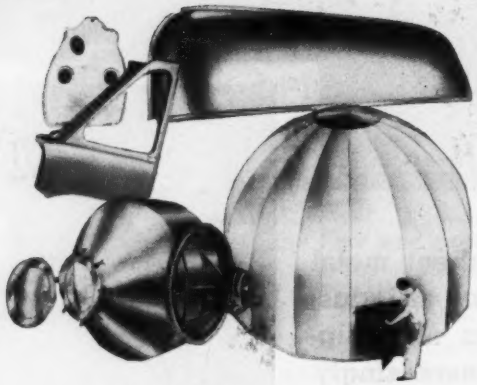

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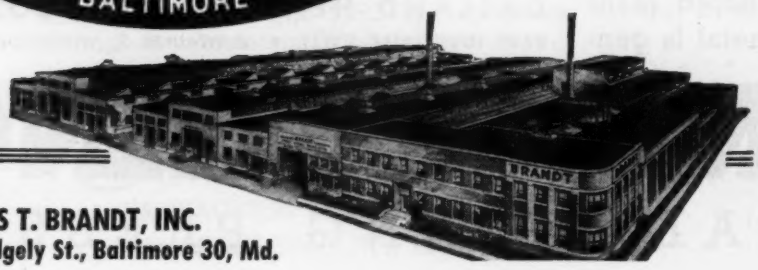

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Pig Iron . . .

Pig Iron Prices, Page 102

Birmingham—Pig iron output, as far as merchant furnaces are concerned, remains at capacity. All available supplies are being taken up pretty much in the south and southeast with requests coming in regularly from other sections.

Republic Steel Corp. increased its prices $3 a ton, effective Jan. 12, to the basis of $41.88 for basic and $42.38 for No. 2 foundry, Birmingham furnace.

Pittsburgh—Merchant pig iron is expected to remain in relatively tight supply throughout first quarter, due to heavy demand from foundries serving the enamelware and radiation industry and expected pickup in activity among small jobbing foundries. Pittsburgh Coke & Chemical Co.'s pig iron stocks are below the level reached early last summer. Pittsburgh Steel Co.'s plan to blow in a second blast furnace has been temporarily abandoned because of developments in the coal industry. When adequate coal supply is assured the company will blow in this stack rated at 600 tons daily.

Philadelphia—Pig iron shipments last week were adversely affected by A. F. of L. strikes at 26 foundries in this district, the most widespread strike among local foundries in many years.

This relieved some of the pressure for coke, with a still easier feeling developing when John L. Lewis suggested to striking miners that they return to their previous 3-day week schedule, beginning Jan. 16.

Boston — Numerous consumers of pig iron are coasting through January on inventories at reduced melt with some improvement in demand indicated for foundry grades next month. At current ratio of prices between pig iron and scrap, shops are utilizing a higher ratio of scrap, although this is not reflected in scrap activity. Answer is low melt and operation on scrap inventories. Pendulum in iron-scrap prices has swung through a full arc with the former $50.50 for No. 2 foundry and No. 1 machinery cast around $32, delivered.

Cleveland—Shipments of merchant iron on long term contracts are brisk, but buying for nearby delivery is sluggish with most foundries' needs well covered. Foundry operations are somewhat improved as compared with a month ago, the automotive shops operating briskly. Foundries engaged on work for the machine tool shops are operating at a faster clip. Over the country as a whole, gray iron foundries are averaging 50 per cent operations.

Buffalo—Despite spotty conditions, leading sellers of merchant iron report January bookings will show improvement from recent months. Encouragement was found in a mild pickup in operations of malleable plants which have been in the doldrums. Pig iron production holds at 94 per cent of capacity.

Cincinnati—Light ordering marks the pig iron market, reflecting a low melt in the district. In contrast, demand for oven foundry coke is active as melters seek protection against possible further curtailment in output of that product. Coke production con-

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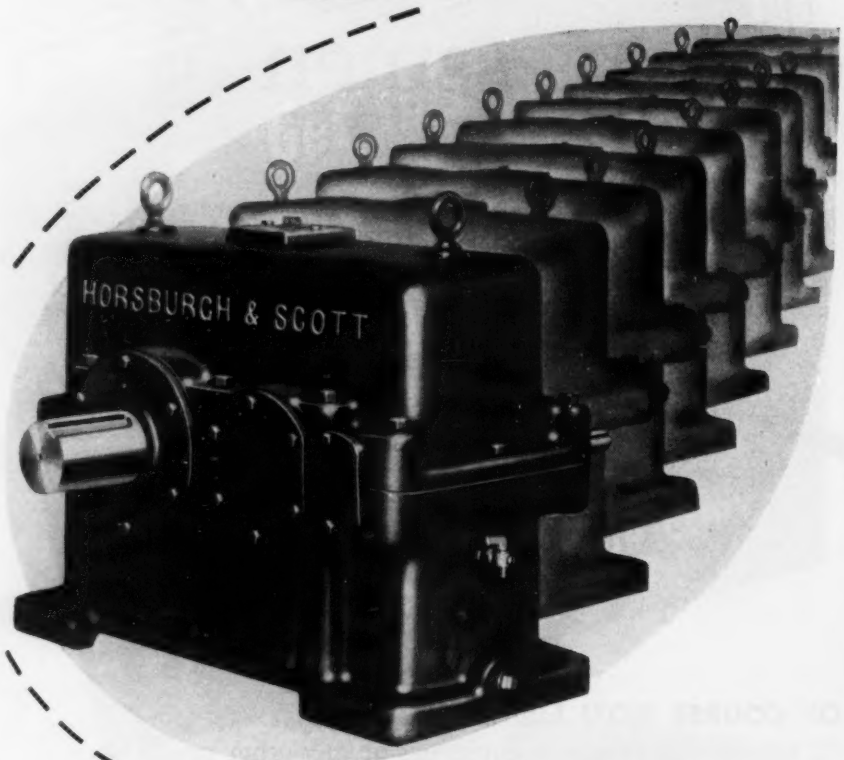

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tinues near normal, but lack of coal reserves incites anxiety.

Chicago — Production of merchant pig iron is geared closely to demand which is steady but far below peak. Operations on the whole remain at about three to four days a week with captive foundries doing better.

St. Louis—Pig iron demand holds at an unexpectedly good level. Jobbing foundries, with a few exceptions, continue slow with the area's biggest doing practically nothing. However, demand from steel plants and captive foundries is good. Canceled or reduced orders usually are offset by replacement orders. There are indications some iron consumers are piling up unneeded supplies in belief the next price movement will be upward, but there is no price boost in the offing now.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 106

Cleveland—Noticeable tightening of coke supplies is reported here as result of the work stoppage at the mines and curtailed output of coal. Consumers have not yet been seriously affected by the supply situation but they anticipate increasing difficulties should the coal mining continue restricted. Some foundries report they are on scanty supplies but so far have been able to obtain enough coke to meet their operating requirements which, in some instances, are still on curtailed basis.

Chicago — Serious shortage of foundry coke would immediately result if business conditions warranted a higher rate of melting operations. Supply about equals demand, with both curtailed. The restricted coal supply has forced some significant changes in coke production, one being complete withdrawal from the market of an important producer whose entire output is now required for operation of its blast furnaces.

Rails, Cars . . .

Track Material Prices, Page 105

New York—Domestic freight car awards in December involved 1220 units, which brought the total for the year up to 6248, as compared with 92,787 in 1948. According to the American Railway Car Institute, last month's total comprised 670 cars placed with car builders and 550 with railroad shops.

Backlogs of unfilled orders on Jan. 1 were 12,036 against 103,896 a year previously. Unfilled orders included 3760 with commercial shops and 8276 with railroad shops. Deliveries last month totaled 3330 against 4376 in November and 9967 in December, 1948.

Deliveries for the year were 92,562, the second highest total since 1924 and exceeded only by 112,634 in 1948.

Of December deliveries, 1950 were from commercial builders and 1380 from railroad shops. Production of the leading types for that month was: 893 hoppers, 860 gondolas, 838 box cars, 201 tank cars and 63 refrigerator cars; for the year, 41,601 hoppers, 18,775 gondolas, 15,668 box, 7742 refrigerator cars and 5110 tank cars.

Refractories . . .

Refractories Prices, Page 107

Pittsburgh—Ladle brick interests are expected to post higher prices this week. Extent of intended advance in schedules was not divulged, but increases likely will follow the pattern adopted by sellers of fire clay, malleable bung and silica brick.

Scrap . . .

Scrap Prices, Page 110

Pittsburgh — Recent purchases of openhearth scrap grades confirm the $30 quotation on No. 1 heavy melting and indicate willingness to deal at current price levels in contrast with efforts to obtain lower prices late last year.

The turnings market has recorded little improvement in activity despite recent serious threat to producers' coal and coke stock position. Similarly there has been no indication of mills increasing the proportion of scrap in melting operations. Failure of foundry activity to register much improvement is reflected in a slight decline in No. 1 cupola cast to a range of $33.50 to $34.

Detroit—Prices on steel grades have sagged another $1 to $2 per ton in the face of determined mill efforts to stabilize the market by a cautious buying policy, and refusal to accept anything but prime industrial material. In this situation, dealers naturally are protesting that published quotations are too high, although last summer they maintained complete silence when a rapidly rising market sometimes bounded ahead of reported prices.

Buffalo—Softer tendencies continue to prevail in scrap. Dealers have resumed shipments to the leading mill consumer, following the lifting of an embargo, but the market undertone is weak as new buying interest is negligible. The fact that mills hold huge reserve stocks augments the bearish side of the trade. Dealers report supplies moving in good volume and would do business at current levels if bids were available. The easier trend was reflected in the cast market with declines of $1 to $1.50 a ton.

Cleveland—Failure of consumers to step up scrap purchases during the latest wave of work stoppages in the coal mines is a distinct disappointment to brokers and dealers here. Usually a coal strike, or even a threatened coal shortage, is accompanied by an upturn in scrap purchases as melters accumulate stocks for use in case lack of fuel curtails pig iron supplies. Mills' scrap inventory position is still strong and their receipts of industrial scrap continue adequate. At the same time, buying of yard scrap continues negligible.

Cincinnati — Consumer buying of scrap has failed to react from holiday dullness. Mill inventories are satisfactory, and foundry needs are light. The prolonged absence of foundry demand is reflected in lowered prices on more expensive grades of cast and short rail. The whole list is on the soft side.

Philadelphia—Scattered buying of No. 2 heavy melting steel and No. 1

Aircomatic welding process Ups production of home heater units 71%... cuts manufacturing costs

THE STEWART-WARNER CORPORATION, South Wind Division, Indianapolis, Indiana, had a problem joining the upper and lower halves of its "Safe-Air Gas Home Heater". Established methods—bolting, or conventional arc welding were inadequate for today's production demands.

D. P. Carey, Airco Technical Sales Representative, was called in. He suggested the completely new, high speed, inert gas-shielded metal arc method of welding stainless steels, aluminum and other hard-to-weld metals . . . the Aircomatic Process. Two heaters were shipped to the Airco laboratory for test welding. The test was 100% successful, and the company immediately ordered Aircomatic equipment and put it to work on a production-line basis.

As a result, former production of 7 units per hour has been increased to 12 units per hour . . . with an accompanying reduction in production costs.

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busheling has been done at slightly lower levels, the market now holding at $21 to $22 delivered. Included was buying by the Phoenix Iron & Steel Co., Phoenixville, Pa., which is resuming ingot production this week for the first time since the property was acquired by the Barium interests.

Chicago—The scrap market continues to drift, although the undercurrent is stronger. Most traders think the bottom has been reached and expect a moderate rise when new buying appears. Only a few grades are currently on order, bulk of tonnage moving appearing to be allocated material which bypasses the dealers. Their prices in consequence vary widely, the range on some items being as great as $8. Foundry buying is fairly steady.

Birmingham — Weaker price tendency in scarp continues. Brokers announce no specific price changes, but trading below posted prices continues. Most yards have large stocks.

St. Lous—December was one of the slowest months on record for scrap movement in this district; January promises to be only a little better. Mills are comfortable with 60 to 90 days' supplies and foundries show no indication of abandoning their hand-to-mouth buying policy. Only one small tonnage of No. 2 melting steel moved last week; a batch of distress metal at $25. In general, short covering is holding No. 2 nearer $26.

Los Angeles—Mill requirements for steelmaking scrap are holding steady, although there is more emphasis than ever on selectivity. The price undertone is firm, with the exception of cupola cast which is off $1 per ton. Decline stemmed from receipt here of foreign pig iron.

San Francisco — Scrap movement continues slow. Mills are well-supplied and show no inclination to enter the market except for whatever top-grade material is needed for inventory replacement.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

12,000 tons, galvanized transmission towers for Bonneville Power Administration, to American Bridge Co., $2,296,758, fob, Pittsburgh.

5000 tons, Bokaro steam power station, India, to Bethlehem Steel Export Corp., New York.

2780 tons, veterans hospital, Philadelphia, to Bethlehem Steel Co.

200 tons, engine house, Pennsylvania Railroad, Columbus, O., to Pittsburgh Bridge & Iron Works, Pittsburgh.

STRUCTURAL STEEL PENDING

6000 tons, Major Degan state boulevard viaduct, Bronx, New York; specifications expected out in several weeks.

4500 tons, state grade crossing elimination, Corning, N. J.; specifications expected out early this year.

2000 to 3000 tons, bridge, Atlantic Beach, Nassau County Bridge Authority, New York; bids within a few weeks.

1650 tons, eight bridges, two concrete, Burlington-Waltham-Lexington, Mass.; bids Jan. 31, State Department of Public Works, Boston.

1500 tons, estimated, state hospital, Middletown, N. Y.; bids Feb. 2.

1500 tons, state bridges, route 128, Wellesley-Needham-Weston-Newton, Mass.; V. Barletta Co., Boston, low.

1225 tons, state turnpike work, Beaver county, Pennsylvania; bids Jan. 31. Tonnage involves 775 tons for section 29-E, 300 tons for section 29-D, and 150 tons for section 30-A.

245 tons, state turnpike construction, section 30-B, Butler county, Pennsylvania; Jan. 31.

800 tons, terminal building, International Airport, Philadelphia; bids Feb. 28.

150 tons, boiler house, Armstrong Cork Co., Lancaster, Pa.; bids Jan. 16.

135 tons, state highway bridge, Danvers, Mass.; C. C. Smith, Watertown, Mass., low, 583,341, including highway work.

REINFORCING BARS . . .

REINFORCING BARS PLACED

450 tons, transmitter building, U. S. Navy center at Jim Creek, Wash., to Bethlehem Pacific Coast Steel Corp., Seattle; general contract to Construction Engineers & Contractors, Tacoma, low $999,735.

120 tons, addition, state infirmary, Belchertown, Mass., to Truscon Steel Co., Boston; Vara Construction Co., Boston, general contractor; West End Iron Works, Boston, awarded structural steel.

REINFORCING BARS PENDING

Unstated, five story administration building for school board, Vancouver, B. C.; Smith Bros. & Wilson Ltd., Vancouver, low $567,123.

Unstated, four story addition to plant of Vancouver Ice & Cold Storage Co. Ltd., Vancouver, B. C.; general contract awarded Commonwealth Construction Co., Vancouver, $133,000.

PLATES . . .

PLATES PLACED

100 tons or more, four 20,000-gal. oil storage tanks for General Petroleum Corp's fueling terminal, Neah Bay, Wash., to Reliable Welding Co., Olympia, Wash.

PLATES PENDING

Unstated, four 10,000-gal. oil storage tanks; bids to Bonneville Power Administration, Portland, Oreg., Jan. 13.

Unstated, storage tank for Liquefied Gas Corp., Puyallup, Wash., proposed plant; award soon.

PIPE . . .

CAST IRON PIPE PENDING

300 tons, 12 inch cast iron pipe, bids in to Vancouver, Wash.; also alternatives.

200 tons, system extension, bids to Tacoma, Wash., during January.

RAILS, CARS . . .

RAILROAD CARS PLACED

Louisville & Nashville, 500 fifty-ton box cars, to Pullman-Standard Car Mfg. Co., Chicago.

Western Fruit Express, 450 refrigerator cars, to Pullman Car & Foundry Co., Seattle.

Atchison, Topeka & Santa Fe, 500 fifty-ton box, to Pullman-Standard Car Mfg. Co., Chicago.

Lehigh & New England, 35 seventy-ton covered hopper cars, to Bethlehem Steel Co.

Union Pacific, 500 fifty-ton box cars and 50 caboose cars, to own shops.

RAILROAD CARS PENDING

Chicago, Rock Island & Pacific, 1000 fifty-ton box cars; bids asked.

Bangor & Aroostock, 200 fifty-ton box cars; bids asked.

LOCOMOTIVES PLACED

Reading, thirty 1500-horsepower diesel-electric road units, to Electro-Motive Division, General Motors Corp., La Grange, Ill.

LOCOMOTIVES PENDING

Missouri Pacific, 34 freight, 21 switch and 8 passenger diesel-locomotives, award expected shortly as the Federal District Court at St. Louis has authorized purchase.

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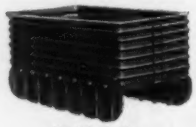

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CONSTRUCTION AND ENTERPRISE

CALIFORNIA

LOS ANGELES—National Container Corp. of California will soon begin construction of a $1 million plant on a tract in the central manufacturing district. A sheet plant and warehouse now operating in Los Angeles will be replaced by the new plant.

SAN FRANCISCO—Workman Packing Co., canned goods producer, will start work this month on a new $200,000 plant. In addition the company will install approximately $50,000 of new equipment.

DELAWARE

DOVER, DEL.—Diesel Engineering & Equipment Co. Inc., machinery, has been chartered by corporation department of the Secretary of State's office here. U. S. Corp. Co. is serving as principal office.

DOVER, DEL.—Montgomery Steel Products Corp., steel and other products, has filed a charter of incorporation with corporation department of Secretary of State's office here; Prentice-Hall Corp. System Inc., principal office.

FLORIDA

MIAMI, FLA.—Florida Power & Light Co., McGregor Smith, president, plans an $18 million expansion program in 1950. Of this amount $5.5 million will be spent for new power plants, nearly $9 million for improvements and additions to customer service facilities, and $2 million to channel the huge additional blocks of power from the new plants and provide additional sources of power supply to communities.

NEW YORK

BUFFALO—Oldman Boiler Works announces plans for a $100,000 expansion program which will double manufacturing space, and also announces appointment of Francis W. Decker to the new post of vice president in charge of engineering.

OHIO

CLEVELAND—Cleveland Screw & Bolt Co. has been incorporated to manufacture and deal in screws and bolts, but will start operations primarily as a sales company. The company is negotiating for a warehouse and office building on the west side.

CLEVELAND — Davis Industrial Finishing Inc., formerly a partnership, has been incorporated with the partners as principal owners of the firm. Located at 3180 W. 32nd St., the company is engaged in finishing of industrial products and also does some fabricating of tubular parts. Elwin, Jerome and C. J. Davis are principal owners of the company.

CLEVELAND—Macey Mfg. Co. has been formed by Keith S. Macey of Macey Drafting Co., Caxton Bldg., for the purpose of manufacturing machinery for the paper industry.

CLEVELAND — Emil Klauss and Herman Krogmann, who have operated as a partnership for the past year dealing in foundry machinery and equipment, have formed a new corporation, Euclid Foundry & Machine Equipment Co. The firm is located at 15109 Saranac Rd. Mr. Krogmann is president and Mr. Klauss, secretary-treasurer of the new organization.

KENT, O.—Consolidated Mold & Die Co. Inc. has been incorporated to manufacture and deal in machinery, etc. Incorporated by W. Jahn, Carl Mazola and Arthur Kaminski.

MANSFIELD, O.—V. S. Geib has started a new firm, Frontier Mfg. Co., which is located in a new building on Ford road. The company has started production of automatic screw machine parts, and expansion of the company is being planned. Mr. Geib formerly was associated with G-W Mfg. Co. which has been purchased by the Mansfield Screw Machine Co.

OREGON

TROUTDALE, OREG.—L. H. Hoffman, Vinnell Co. of the Pacific, C. T. Malcolm and R. J. Strasser, Portland, Oreg., and Roy T. Earley Co., Tacoma, Wash., have been awarded contracts for furnishing and installing fume control equipment at the local plant of Reynolds Metal Co., a $2 million project.

WASHINGTON

RICHLAND, WASH.—A portion of the proposed $200 million expansion of the Hanford Atomic Works is reported awarded to Atkinson-Jones Construction.

SEATTLE—Construction Engineers & Contractors, Tacoma, Wash., submitted low basic bid, $999,735, to U. S. Navy for transmitter building at Jim Creek communications center near Arlington, Wash. Project involves 150 tons shapes and other tonnages.

SEATTLE—Bureau of Reclamation reports that $114 million of $120 plus million allotted to water resources development in the Pacific Northwest will be used in construction of 17 projects in Washington, Oregon, Idaho and Montana in the 1950 fiscal year.

SEATTLE—Western Electric Co., Portland, Oreg., has been awarded a $130,000 contract for construction of facilities at the naval communications center near Arlington, Wash.

TACOMA, WASH.—Wick & Dahlgren, Seattle, are contractors for proposed 15-story, $1,150,000 Park Tower apartments, plans by Miller & Ahlson, Seattle architect.

CANADA

VANCOUVER, B. C.—Alliance Ware Ltd. plans a $100,000 plant for manufacture of porcelain on steel paneling and electric light signs; architect, Sharp & Thompson.

VANCOUVER, B. C.—Liquid Carbonic Canadian Corp. Ltd., 2197 W. 11th Ave., plans early construction of a $500,000 plant at 75th avenue and Burnard street; McArter & Nairn, architect, are preparing preliminary plans.

HAMILTON, ONT.—W. H. Cooper Construction Co. Ltd. has been awarded the general contract for a new administration building of the Hydro-Electric System of Hamilton. Contract price is $1,119,670, and work will begin almost immediately.

HAMILTON, ONT.—Dominion Fasteners Ltd. will construct a new plant within the next six months to expand its production facilities.

TORONTO, ONT.—British Oxygen Co. Ltd. will erect a new plant, cost not disclosed.

TORONTO, ONT.—Thor-Canadian Co. Ltd. announces plans to build a new $2 million factory on the outskirts of Toronto this year.

FERROALLOYS

(*Continued from Page* 107)

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Contract, c.l., 8MxD, bulk, 22.0c per lb of contained Cr, c.l., packed 22.9c, ton 24.25c, less ton 26.0c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max. 0.03% C 31.85c per lb of contained Cr, 0.04% C 29.75c, 0.06% C 28.75c, 0.10% C 28.25c-28.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 1.50% C 27.1c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

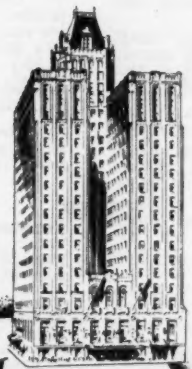
"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, C 0.75-1.25% max.). Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lots 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. And 5c for each 0.25% of N above 0.75%.

Chromium Metal: (Min. 97% Cr and 1%Fe). Contract, carload, 1" x D; packed, max 0.50% C grade, $1.03 per lb of contained chromium, ton lot $1.05, less ton $1.07. Delivered. Spot, add 5c.

Silicon Alloys

25-30% Ferrosilicon: Contract, carload, lump, bulk, 17.00c per lb of contained Si; packed 18.40c; ton lot 19.50c, f.o.b. Niagara Falls,



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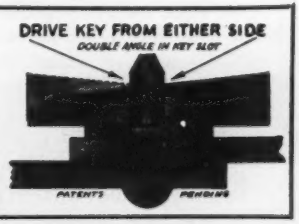

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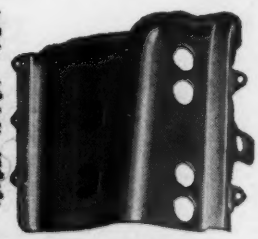

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Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si, carload packed 14.8c, ton lot 15.95c, less ton 17.2c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk, 14.65-15.00c per of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 16.5c per lb of contained Si, carload packed 17.7c, ton lot 18.65c, less ton 19.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe). C.l. lump, bulk, regular 19.0c per lb of Si, c.l. packed 20.2c, ton lot 21.1c, less ton 22.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 7.65c per lb of alloy, ton lots packed 9.05c, 200 to 1999 lb 9.40c, smaller lots 9.90c. Delivered. Spot up 0.5c.

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 13.75c per lb of briquet, carload packed 14.45c, ton lot 15.25c, less ton 16.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.45c per lb of briquet, c.l. packaged 11.25c, ton lot 12.05c, less ton 12.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 10.30c, per lb of briquet, c.l. packaged 11.1c, ton lot 11.9c, less ton 12.8c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.15c per lb of briquet, c.l. packed 6.95c, ton lot 7.75c, less ton 8.65c. Delivered. Spot, add 0.25c.

(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.30c, c.l. packed 7.10c, ton lots 7.90c, less ton 8.80c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) 95.00c per pound of Mo contained. F.o.b. Langeloth, Pa.

Calcium Alloys

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%.) Contract, carload, lump, bulk 19.25c per lb of alloy, carload packed 20.05c, ton lot 21.55c, less ton 22.55c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 17.9c per lb of alloy, carload packed 19.1c, ton lot 21.0c, less ton 22.5c. Delivered. Spot add 0.25c.

Titanium Alloys

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lots 2" x D, $1.40 per lb of contained Ti; less ton $1.45. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.) Ton lot $1.28, less ton $1.35, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $160 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 3-4.5%.) Contract, $175 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

Vanadium Alloys

Ferrovanadium: Open-Hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max.) Contract, any quantity, $2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3. **Primos and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.) $3.10.

Grainal: Vanadium Grainal No. 1, 93c; No. 6 63c; No. 79, 45c, freight allowed.

Vanadium Oxide: Contract, less carload lots, $1.20 per lb contained V_2O_5, freight allowed. Spot, add 5c.

Tungsten Alloys

Ferrotungsten: (70-80%). Contract, 10,000 lb W or more, $2.25 per lb of contained W; 2000 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

Zirconium Alloys

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.l., lump, bulk 6.6c per lb of alloy, c.l. packed 7.35c, ton lot 8.1c, less ton 8.95c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract carload, lump, packed 20.25c per lb of alloy ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

Boron Alloys

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 75c per pound; Grade B (14-18% B) $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $4.25 per lb contained B, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbotam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Other Ferroalloys

Ferrocolumbium: (Cb 50-60%, Mn 5% max., Si 8% max., C 0.5% max.). Contract, ton lot, 2" x D, $2.90 per lb of contained Cb, less ton $2.95. Delivered. Spot, add 25c.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Carload, 12 M x D, carload packed 19.0c per lb of material, ton lot 19.75c, less ton 21.0c. Delivered.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8% Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed. 1" x D, 43c per lb of alloy, ton lot 45c, less ton 47c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed, ½" x 12 M, 16.5c per lb of alloy, ton lots 17.50c, less ton 18.5c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 17.00c per lb of alloy; ton lots 18.00c; less ton lots 19.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 14.25c per lb of alloy; ton lots 15.75c; less ton lots 17.00c, f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al). Lump, bulk, carload 11.00c. Ton lots, bulk 11.50c, packed 11.75c. Less ton lots, packed 12.25c per lb of alloy, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Ferrophosphorus (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base); Gross tons per carload, f.o.b. seller's works, Mt. Pleasant, or Siglo, Tenn., $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo, f.o.b. Langeloth and Washington, Pa., furnace, any quantity $1.13.

Technical Molybdic-Oxide: Per lb, contained Mo, f.o.b. Langeloth and Washington, Pa., packed in bags containing 20 lb of molybdenum, 95.00c.